Diabetes in Manitoba 1989 to 2006

REPORT OF DIABETES SURVEILLANCE

May 2009

Manitoba

Key Results

Diabetes Prevalence

- Manitoba has experienced a considerable growth in the number of people one year of age and older with diabetes from 32,468 (or one in 36) in 1989 to 76,608 (or one in 16) in 2006.
- In 2006, the age-adjusted diabetes prevalence rate was 5.5% (ages one year and older). It has doubled from 2.8% in 1989.
- The prevalence of diabetes in First Nations people was much higher (one in 10) than in Manitobans overall for each age group. It was at about four times the rate for 20-to-65 years of age, and about 2.5 times the rate for the group ages 65 years and older.
- Diabetes prevalence in 2006 was highest for 70-to-84-year-old Manitobans at 20% for women and 24% for men.
- Diabetes prevalence in 2006 was highest for First Nations people between the ages of 60 to 79 years, at 53%.

Diabetes Incidence

- The number of new diabetes cases has almost doubled from a five-year average of 3,920 per year, between 1989 and 1993 to 6,390 per year, between 2002 and 2006.
- In 2006, the age-adjusted diabetes incidence rate was six per 1,000 (ages one year and older) in Manitoba. It has increased by 50% from four per 1,000 in 1989.
- First Nations people were about three times more likely to be diagnosed with diabetes in any year compared to Manitobans overall.
- Diabetes incidence between 2002 and 2006 was highest for Manitobans ages 65 to 79 years. It was 15 per 1,000 for women and 20 per 1,000 for men.
- Diabetes incidence between 2002 and 2006 was highest for First Nations Manitobans between the ages of 55 to 84 years, at about 42 per 1,000.

Deaths of People with Diabetes

- Deaths of people with diabetes in Manitoba accounted for about one-quarter (26%) of all Manitoba deaths in each year.
- In the past two decades, overall mortality rates have consistently been more than twice as high in people with diabetes, compared to those without diabetes.
- Mortality rate ratios demonstrate that younger people with diabetes have a much higher risk of dying than older people, when compared to those without diabetes in the same age groups.
- The risk of death among people with diabetes, compared to those without, was significantly higher for women than for men. However, age-adjusted mortality rates for men with diabetes were higher.
- The risk of death among people with diabetes, compared to those without, was significantly lower for First Nations people than for the whole Manitoba population.
- Diagnosed diabetes shortens projected life expectancy for all ages. For example, both men and women in the 20-to-29-year age groups would have more than a 10-year reduction in years of life remaining compared to those without diabetes.

Lower Limb Amputation

- Lower limb amputation among people with diabetes in Manitoba accounted for about three-quarters (77%) of all Manitobans with lower limb amputation.
- Age-adjusted lower limb amputation rates of people with diabetes were relatively stable between 1989 and 1996. Since 1997, lower limb amputation has gradually declined by about 35%.
- In Manitoba, people with diabetes were almost 30 times more likely to have a lower limb amputation than people without diabetes, after adjusting for age.
- Lower limb amputation was almost twice as common in males, both with and without diabetes, as in females.

- Lower limb amputation is very rare in young people without diabetes but becomes more common in older adults, with or without diabetes.
- While there are more older people with lower limb amputation, younger people with diabetes have a much higher risk of lower limb amputation than older people, when compared to those without diabetes in the same age groups.
- Age-adjusted lower limb amputation rates of First Nations men and women with diabetes were more than three times higher than for all Manitoba men and women with diabetes.

Chronic Kidney Disease (CKD)

- People with diabetes in Manitoba accounted for about half (50%) of all Manitoba hospital patients with a CKD diagnosis in each year between 2000 and 2004, compared to one-third (34%) diabetes-related between 1989 and 1993.
- In Manitoba, people with diabetes were almost 10 times more likely to have a chronic kidney disease hospital diagnosis than people without diabetes.
- Men with diabetes had higher age-adjusted chronic kidney disease rates than women with diabetes.
- The risk of being diagnosed with CKD among people with diabetes, compared to those without, was significantly higher for women than for men.
- CKD is very rare in young people without diabetes but becomes more common in older adults with or without diabetes.
- While there are more older people with CKD hospital diagnoses, younger people with diabetes have a much higher risk of CKD hospitalization than older people, when compared to those without diabetes in the same age groups.
- Average age-adjusted CKD rates in First Nations people with diabetes were more than twice as high as Manitoba rates.

Circulatory System Diseases (CSD) - Heart Disease and Stroke

- People with diabetes in Manitoba accounted for almost one-third of all Manitobans diagnosed with CSD in each year between 2000 and 2004, compared to less than one-quarter between 1989 and 1993.
- In Manitoba, people with diabetes were almost 3.5 times more likely to have a circulatory system disease hospitalization than people without diabetes.
- CSD rates among people with diabetes have gradually and significantly decreased over the years, from an average of about 68 per 1,000 diabetes cases between 1989 and 1993, to 58 per 1,000 diabetes cases between 2000 and 2004. The rate of decrease was lower for men than for women.
- CSD risk among people with diabetes, compared to those without, was significantly higher for women than for men. Age-adjusted circulatory system diseases rates for men with diabetes were higher. This may suggest that the commonly observed female protection against heart disease is substantially reduced by diabetes.
- While there are more older people with CSD hospital diagnoses, younger people with diabetes have a much higher risk of CSD hospitalization than older people, when compared to those without diabetes in the same age groups.
- Average CSD rates in First Nations people with diabetes were more than 60% higher than in the overall Manitoba population with diabetes. This may suggest a slightly elevated CSD risk in First Nations people without diabetes. However, CSD hospitalization risk among people with diabetes, compared to those without, was slightly, but significantly, lower for First Nations people than for the whole Manitoba population.

Days in Hospitals

- Manitobans with diabetes accounted for more than one-quarter of all Manitoba days of hospitalization in each year between 2002 and 2006, compared to 17% of hospital days between 1989 and 1993.
- In the past two decades, age-adjusted days-of-hospitalization rates have significantly declined by about 46% for those without diabetes and about 40% for those with diabetes.
- Between 2002 and 2006, Manitobans with diabetes spent more than three times (3.5) as many days in hospital as Manitobans without diabetes.
- The days-of-hospitalization rate ratios demonstrate that younger people with diabetes have higher hospital use than older people who have diabetes, when compared to those without diabetes in the same age group.
- Days-of-hospitalization rate ratios among people with diabetes, compared to those without, were significantly lower for First Nations people than for the whole Manitoba population. Age-adjusted days-of-hospitalization rates for First Nations people with diabetes were about 40% higher than in the overall Manitoba population with diabetes.

Physician Visits

- Manitobans with diabetes accounted for 14% of all Manitoba physician visits in each year between 2002 and 2006. This is double the 7% diabetes-related physician visits between 1989 and 1993.
- Physician-visits rate ratios have changed little over time. Between 1989 and 2006, Manitobans with diabetes visited physicians more than two times (2.2) as often as Manitobans without diabetes.
- Physician-visits rate ratios demonstrate that younger people with diabetes have more physician visits than older individuals who have diabetes, when compared to those without diabetes in the same age groups.
- Females, both with and without diabetes, had consistently and significantly higher physician visit rates than males across all fiscal years, with about 2.5 more visits per year for females with diabetes.

Diabetes Prevalence Projections

- The future prevalence of diabetes in Manitoba may be projected based on surveillance prevalence cases, incidence and mortality rates, and population projections.
- If current prevention efforts and obesity levels prevail and incidence rates remain constant at the levels observed between 2002 and 2006, then it is projected that there will be about 111,000 Manitobans with diabetes by 2016, representing about 8.5% of the population. This is about twice the number of Manitobans with diabetes in the year 2000.
- If incidence rates continue to increase as they have during the 1990s, then the projections indicate about 116,000 Manitobans living with diabetes by 2016, representing 9% of the population.
- The number of diabetes cases is projected to increase by about 78% among Manitobans 60 to 69 years of age from 2006 to 2016, with more than one-quarter (26%) of the Manitoba population older than 70 years with diabetes by 2016.

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1 Introduction and Methods

1.1 Background

Diabetes is a serious and growing public health problem worldwide. Manitoba's population experiences a high prevalence of this disease, particularly in seniors and Aboriginal people who are at elevated risk for Type 2 diabetes. Diabetes is a serious, chronic, systemic disease characterized by the body's inability to sufficiently produce and/or use insulin, a hormone produced by the pancreas that assists with the conversion of glucose (sugar) into energy. Without insulin, blood sugar rises to levels where they are interfering with the proper nourishment of body cells.

The burden of illness associated with diabetes is high because people with diabetes are at risk of developing complications as a result of this disease. This risk is strongly related to poor control of blood sugars and the duration of diabetes. Chronic high blood sugar levels are associated with heart disease and stroke, blindness, kidney disease, peripheral nerve problems amputations and other complications. People with diabetes may reduce their risks of complications by controlling blood sugar and blood pressure with a healthy diet, exercise and medications.

One of the goals of *Diabetes: A Manitoba Strategy*[1] and the *Regional Diabetes Program Framework*[2] was to establish a diabetes surveillance system to provide data to monitor and evaluate diabetes prevention, education, care, research and support in Manitoba. Surveillance provides information essential to planning, intervention, research, priority setting, policy development, issue management or risk management. Ideal models to deliver the best prevention and care start with surveillance data. Ongoing surveillance is necessary to judge the effectiveness of both new and old health care delivery systems.

The purpose of this report is the dissemination of diabetes surveillance information to address the surveillance goal of *Diabetes: A Manitoba Strategy* and the *Regional Diabetes Program Framework*. The information in this report will be useful for policy makers to plan initiatives, and for researchers to identify priority themes for diabetes-related research.

1.2 Diabetes Introduction

1.2.1 Three Types of Diabetes

There are three different types of diabetes:

- **Type 1** – formerly called insulin-dependent or juvenile-onset diabetes. The beta cells of the pancreas produce no or inadequate insulin. It usually begins before an individual is 20 years of age. Type 1 diabetes is believed to be caused by a combination of genetic factors and environmental stressors leading the body's own immune system to attack insulin secreting beta cells in the pancreas. People with Type 1 diabetes must administer multiple, daily insulin injections and carefully monitor their blood sugar levels, physical activity and food intake. People with Type 1 diabetes will die if they do not take their insulin.
- **Type 2** – formerly called non-insulin-dependent or adult-onset diabetes. The body is unable to use its own insulin (insulin resistance). Obese individuals more than 40 years old are at highest risk of Type 2 diabetes. It appears that certain ethnic groups are at particularly high risk of developing Type 2 diabetes, specifically South Asians, African Americans and North American First Nations populations. Type 2 diabetes is managed with weight reduction, changes in food intake and exercise, and regular monitoring of blood sugar. In many cases, however, people with Type 2 diabetes may require medication to stimulate insulin release by the pancreas or help overcome insulin resistance and may require insulin injections.
- **Gestational diabetes** – occurs during pregnancy among women not known to have had diabetes before pregnancy; it's also more common in certain ethnic groups like Aboriginal women. Diabetes that occurs in pregnancy is usually managed by changes in food intake and physical activity but may also require insulin by injection. Blood sugar levels often return to normal after delivery of the baby, but both the mother and baby are at increased risk of developing Type 2 diabetes in the future.

[1] *Diabetes: A Manitoba Strategy* (http://www.gov.mb.ca/health/chronicdisease/diabetes/docs/strategy/diabetes_strategy.pdf)
[2] *Regional Diabetes Program Framework* (http://www.gov.mb.ca/health/chronicdisease/diabetes/docs/rdpf.pdf)

1.2.2 Diagnosis of Diabetes

In 1998, the Canadian Diabetes Association (CDA) published revised criteria for diagnosis and classification terminology[1]:

1) Symptoms of diabetes (fatigue, excessive thirst, excessive urination and unexplained weight loss) plus a casual (any time during the day) plasma glucose value of ≥ 11.1 mmol/L; OR
2) A fasting (no caloric intake for at least eight hours) plasma glucose test (FPG) of ≥ 7.0 mmol/L. (In 1998, the criterion was lowered from 7.8 to 7.0; this likely resulted in an increase in the number of individuals with a diagnosis of the disease); OR
3) A plasma glucose value in the two-hour sample (2hPG) of the oral glucose tolerance test (OGTT) ≥ 11.1 mmol/L.

1.3 Methods

1.3.1 Diabetes Surveillance

This report is based on the methodology and infrastructure of the National Diabetes Surveillance System (NDSS)[2], a mechanism developed to provide improved data about diabetes so that policymakers, researchers, health practitioners, and the general public could make better public and personal health decisions. The NDSS is a network of regionally-distributed diabetes surveillance systems that compile administrative health care data relating to diabetes and was created to improve the breadth of information about the burden of diabetes in Canada. The NDSS infrastructure is funded and supported by the Public Health Agency of Canada (PHAC) and will be expanded to include additional chronic conditions in the next few years.

Underlying the NDSS concept is the assumption that the clinical path of diabetes, from detection to the treatment and management of complications, makes it possible to track the diabetes burden through various client interactions (physician visits, hospitalizations, etc.) within provincial and territorial health care systems. Tracking is possible because data are captured routinely in the provision of publicly funded, insured health services and are stored in several major provincial and territorial administrative databases.

1.3.2 Data Sources and Case Definition

Data Sources

In each province and territory, administrative data are linked to provide a rich data source on diabetes in Canada. Specific data sources used by NDSS are:

- **Health Insurance Registry:** contains health insurance information for each person insured in Manitoba and provides the population base, demographics and vital status for each year.
- **Hospital Discharges:** hospital records for each person discharged from acute care hospitals in Manitoba are used to identify co-morbid conditions and for defining the incident and prevalent cases.
- **Medical Services:** claims for service records submitted by physicians to the Manitoba government for reimbursement are also used for defining the incident and prevalent cases.

Case Definition

The NDSS applied a validated case definition to this combined data source to extract the data. Individuals were included in the NDSS data set when they met the current Manitoba case definition, which requires that an individual must have **EITHER:**

- one hospitalization with an ICD-9 code of 250 (diabetes mellitus), selected from all available diagnostic codes on the Hospital Discharge Abstract for the years 1984/85 to 2003/04, or equivalent ICD-10 codes E10 to E14 for the years 2004/05 to 2005/06; **OR**
- two physician claims with the relevant ICD codes within two years, selected from the first diagnostic code available on the claim; **OR**
- one physician claim followed by a hospitalization, with the relevant ICD codes within two years.

The case date is defined as the earliest date of hospitalization, or the later of the two physician claims that contribute to the case definition. When the earliest hospital diagnosis is preceded by a single physician claim diagnosis, the hospital diagnosis date is used as the case date.

[1] *1998 Clinical Practice Guidelines for the Management of Diabetes in Canada* (http://www.diabetes.ca/files/cpg98eng.pdf)
[2] *National Diabetes Surveillance System Methods Documentation, 2008* (http://www.phac-aspc.gc.ca/ccdpc-cpcmc/ndss-snsd/english/diabetes_data/00-06/pdf/method_v208-eng.pdf)

Prevalence and incidence estimates do not include gestational diabetes and, therefore, the case definition excludes any diabetes diagnoses made for women in the 120 days preceding the first pregnancy-related visit and 90 days after the last pregnancy-related visit.

1.3.3 Age-adjusted and Age-specific Rates and Rate Ratios

Age Adjustment (also called age standardization)

Age adjustment allows comparisons to be made between regions that have populations with different age distributions or comparisons over time by accounting for an aging population. To adjust for differences in population age distributions across regions, and the resulting effect on rates, the rates are age-adjusted using the 1991 Canadian Census population estimates as a reference population. Adjustment is done via the direct method, using five-year age groups from one to four years of age to age 85 and over.

All rates used for comparisons in this report: between years, men and women, First Nations people and Manitobans, among regions, and between those with and without diabetes are adjusted for the effects of age.

Age Groups for Age-specific Rates

An age-specific rate is the rate measured in a particular age group. Four age categories were selected for calculation of age-specific prevalence rates based on homogeneity of individuals in each age range. The one-to-19-year age group consists of children and adolescents in the period of greatest physical growth and development who experiment with various health behaviours. Diagnosis of Type 1-DM is characteristic of this age group. Those aged 20 to 44 years are young adults, generally healthy and without serious health problems but in the process of establishing behaviours that will effect their health later in life. The 45-to-64-year age group represents adults in their middle years, when serious health problems become more prevalent. The 65-year-and-older age group may be described as seniors, whose health problems become not only more frequent but also more serious.

Diabetes Consequences Rate Ratios

Some health conditions and health care use indicators are considerably elevated in people with diabetes compared to people without diabetes. Some of these "consequences of diabetes" included in this report are death, hospital visits due to lower limb amputation, chronic kidney disease and circulatory system diseases, days of hospitalization and physician visits. Related age-adjusted and age-specific rates are presented for the people with diabetes and compared to the population without diabetes. The ratio of the age-adjusted rate of a consequence in people with diabetes, compared to the rate in people without diabetes, indicates the relative level of risk, or increased likelihood, of that health condition or health care use occurring in people with diabetes.

Interpreting the Rates

As with any measurement of a population, estimated prevalence or incidence rates have a certain variability due to chance. Therefore, we cannot be 100% certain that any difference in the observed rates represents a statistically significant difference in the real rates of any two or more population groups. To facilitate comparisons, 95% confidence intervals (CIs) of all age-adjusted and age-specific rates were calculated using an inverse gamma distribution when the rate is greater than zero. We can be 95% certain that the true value for the rate lies somewhere in this range of values. If the text reports a difference between two values and the 95% CIs of the values do not overlap, then one can be reasonably sure that a statistical difference likely exists and the text will indicate that this is a "significant" difference.

1.3.4 National Diabetes Surveillance System Limitations

Limitations

- Administrative data are unable to differentiate between Type 1 and Type 2 diabetes because ICD-9 coding in medical service claims does not make the distinction between the two types (code 250). This may have implications in terms of diabetes care planning which may need to differentiate between these groups.
- Administrative data excludes undiagnosed diabetes (up to 30% of DM).
- People with physician-diagnosed DM are excluded if they receive their care in a setting where services are not billed on a fee-for-service basis, although some of the salaried physicians may remit service information through "shadow billing".
- The case definition currently being used requires two years of complete follow-up time for each individual and it is not possible to know whether cases that are ascertained at the beginning of the study period are incident cases or prevalent cases. Therefore, Manitoba prevalence reporting starts in1988/89 after a four-year run-in period.

False Positives

Any system which tracks a life-long disease, such as diabetes, over many years on an individual basis will tend to accumulate false positives. This is because a case, once identified, becomes part of the permanent record and is carried forward from year to year. Even if false positives are extremely rare, they will still inevitably comprise an increasing proportion of reported cases over time. Manitoba Health and Healthy Living is committed to ongoing research to develop validated case definitions and quality control measures to eliminate false positives.

1.3.5 Diabetes in Children and Adolescents

For previous reports, the diabetes case definition was applied to adults ages 20 years and older. In 2007, the NDSS adopted the adult diabetes case definition for the population one year of age and older, a conservative rule accounting for both Type 1 and Type 2 diabetes. By 2006, fewer than 1,000 diabetes cases have been identified in the population younger than 20 years of age in Manitoba, accounting for less than 1.5% of all diabetes cases. Including the younger than 20-years age group in the denominator decreases reported prevalence rates by up to 2% for the entire Manitoba population and 6% for the First Nations population.

1.3.6 Diabetes in First Nations People

The term "First Nations people" is used in the context of this report to describe the population of individuals who have been determined by Manitoba Health and Healthy Living to be registered, or eligible for registration, under the *Indian Act* of Canada (R.S.,c.I-6, s.1). Manitoba Health and Healthy Living makes this determination for adults based on self-report and postal code of an individual (typically at the time when Manitoba Health numbers are issued). In the case of dependent children, this determination is automatically made for any children in a household when the household head has made a declaration of entitlement under the *Indian Act* for themselves or their children. The term "First Nations people" has been adopted to denote this population, although this specific phrase is not defined by the *Indian Act*.

Manitoba Health and Healthy Living undercounts registered First Nations people living in Manitoba (77,797 in 2005 vs. 119,276 reported by First Nation and Inuit Health Branch for the same year) because not all registered Indians report their status when applying for health coverage. The rates in this report are based on the health information of those individuals who, in the 2005/06 fiscal year, could be identified as having First Nations people status. Because First Nations people are undercounted in the Manitoba Health Insurance Registry, the number of First Nations people diabetes cases will also be an underestimate. Therefore, prevalence and incidence counts of diabetes in First Nations people will not be provided in this report. However, we assume that the distribution of diabetes and related health events in registered Indians who disclosed their status to Manitoba Health is representative of First Nations people in Manitoba. Therefore, we will report on the rates of diabetes and its consequences in this important population.

Diabetes Prevalence and Incidence

2 Diabetes Prevalence and Incidence

2.1 Diabetes Prevalence in Manitoba

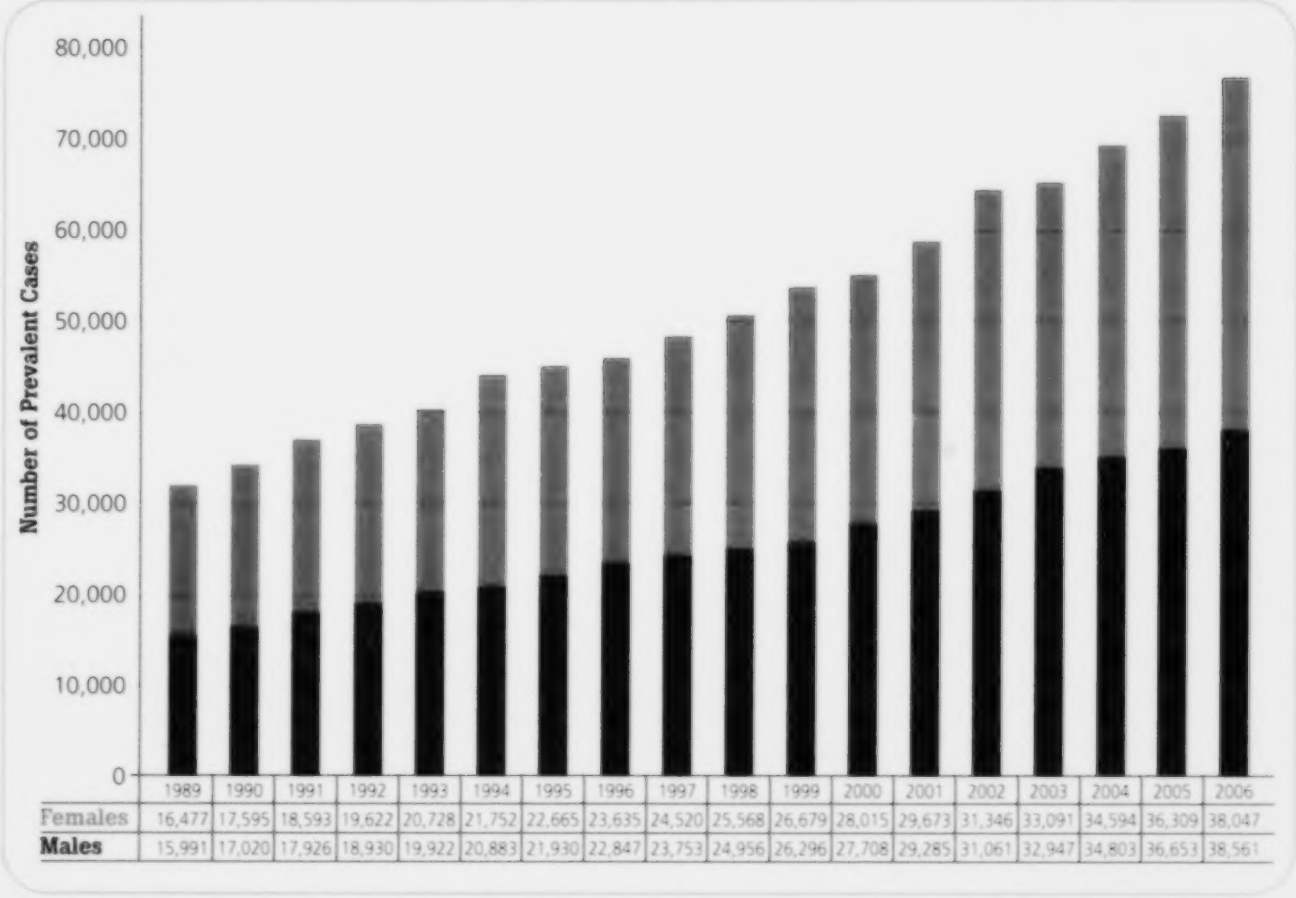
2.1.1 Definition

"Prevalence" is the total number of people known to be living with a disease at any time during a specific period. It provides an estimate of the importance and burden of disease at a given time, and is widely used in public health monitoring and planning. Diabetes prevalence is defined as the number of cases existing within the population during the fiscal year (April 1 to March 31). The corresponding period prevalence rate is calculated as follows:

$$\text{Prevalence Rate (\%)} = \frac{\text{Total number of people with a diabetes case date prior to and including March 31 of the current fiscal year}}{\text{Total population count for the current fiscal year}} \times 100$$

The denominator uses the count of people for the entire year rather than the mid-year estimate. It includes people who migrate or die during the year, since they are included in the numerator.

2.1.2 Prevalent Diabetes Cases 1988/89 to 2005/06



	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Females	16,477	17,595	18,593	19,622	20,728	21,752	22,665	23,635	24,520	25,568	26,679	28,015	29,673	31,346	33,091	34,594	36,309	38,047
Males	15,991	17,020	17,926	18,930	19,922	20,883	21,930	22,847	23,753	24,956	26,296	27,708	29,285	31,061	32,947	34,803	36,653	38,561

Figure 1: Manitoba Diabetes Cases 1988/89 to 2005/06

- Manitoba has experienced considerable growth in the number of people one year of age and older with diabetes from 32,468 (or one-in-36) in 1988/89, to 76,608, (or one-in-16) in 2005/06.
- The proportion of female cases has gradually declined from 50.7% in 1988/89 to 49.7% in 2005/06, reflecting a doubling of the percentage difference between men and women.
- The number of First Nations people with diabetes who are registered with Manitoba Health and Healthy Living has more than tripled between 1988/89 and 2005/06. The number of First Nations males with diabetes has almost quadrupled in this time.
- NDSS data[1] for 2005/06 shows that Manitoba had the fourth-highest diabetes prevalence rate in the one year and older population, compared to other provinces and territories.

[1] *Report from the National Diabetes Surveillance System: Diabetes in Canada, 2008* (http://www.phac-aspc.gc.ca/publicat/2008/ndssdic-snsddac-08/pdf/ndssdic-snsddac-08_eng.pdf)

2.1.3 Diabetes Prevalence Rates 1988/89 to 2005/06

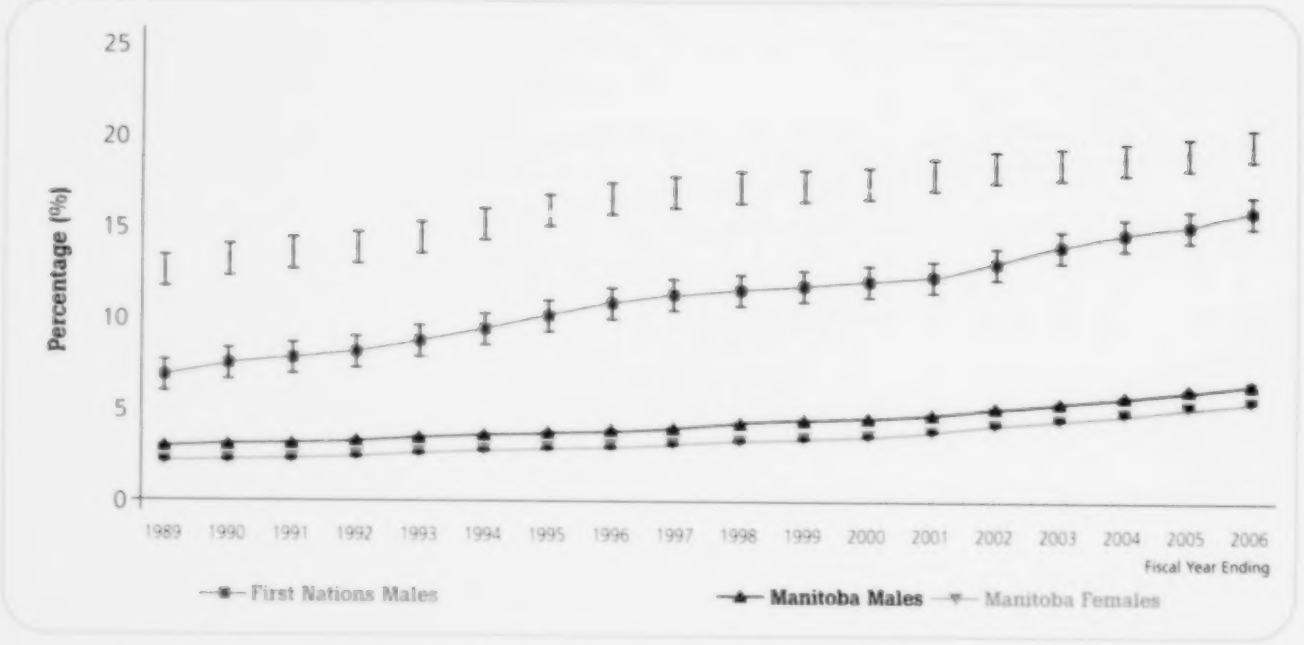
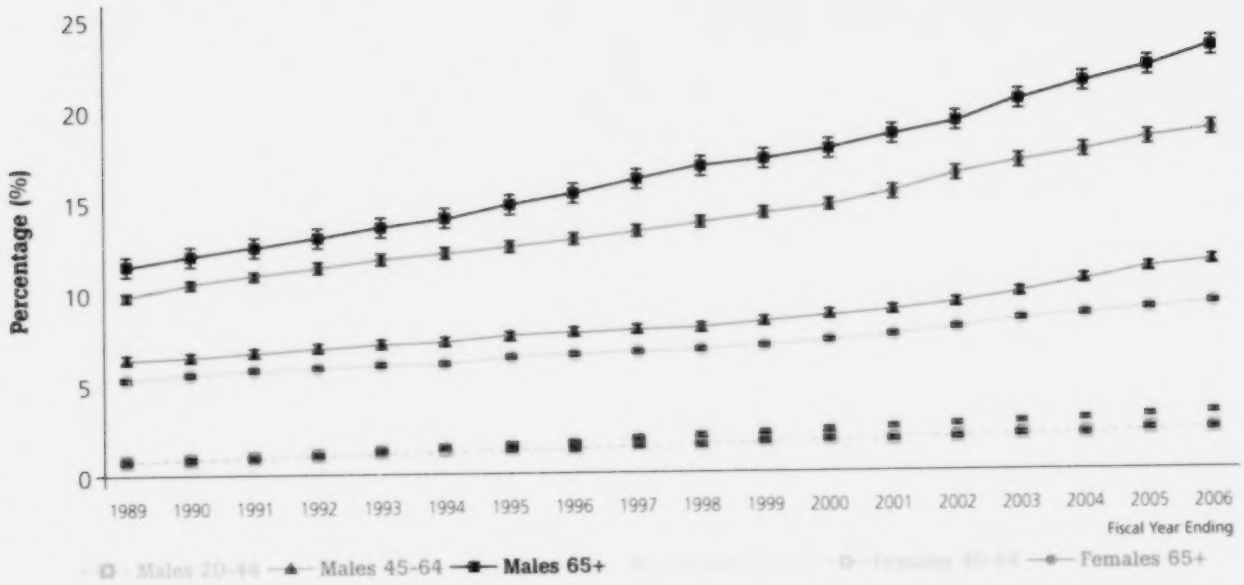


Figure 2: Age-adjusted Diabetes Prevalence Rates (one year and older) 1988/89 to 2005/06

- In 2005/06, the unadjusted diabetes prevalence rate in Manitoba was 6.4% (ages one year and older).
- The overall age-adjusted diabetes prevalence rate has doubled from 2.8% in 1988/89 to 5.5% in 2005/06.
- For Manitoba overall, the male diabetes prevalence rate has been higher than the female rate, with the difference increasing from 0.3% in 1988/89 to 0.7% in 2005/06.
- The increase in prevalence has been highest in First Nations males growing from 7.1% in 1988/89 to 15.5% in 2005/06. This represents a diabetes growth rate of 0.5% per year, compared to 0.2% per year for Manitoba males overall. The diabetes prevalence rate in male First Nations people was almost three times higher than in Manitoba males.
- For Manitoba First Nations people, the rate of females with diabetes has been higher than the male rate but the difference has been decreasing from 5.3% in 1988/89 to 4.3% in 2006.
- Unlike Manitoba females overall, diabetes prevalence was highest in First Nations females at 19.9% in 2005/06. This was almost four times the age-adjusted rate of 5.2% in Manitoba females overall.
- The unadjusted diabetes prevalence rate of Manitoba First Nations has doubled from one in 20 (4.6%) to one in 10 (10.4%).

2.1.4 Age-group and Sex-specific Prevalence Rates 1988/89 to 2005/06

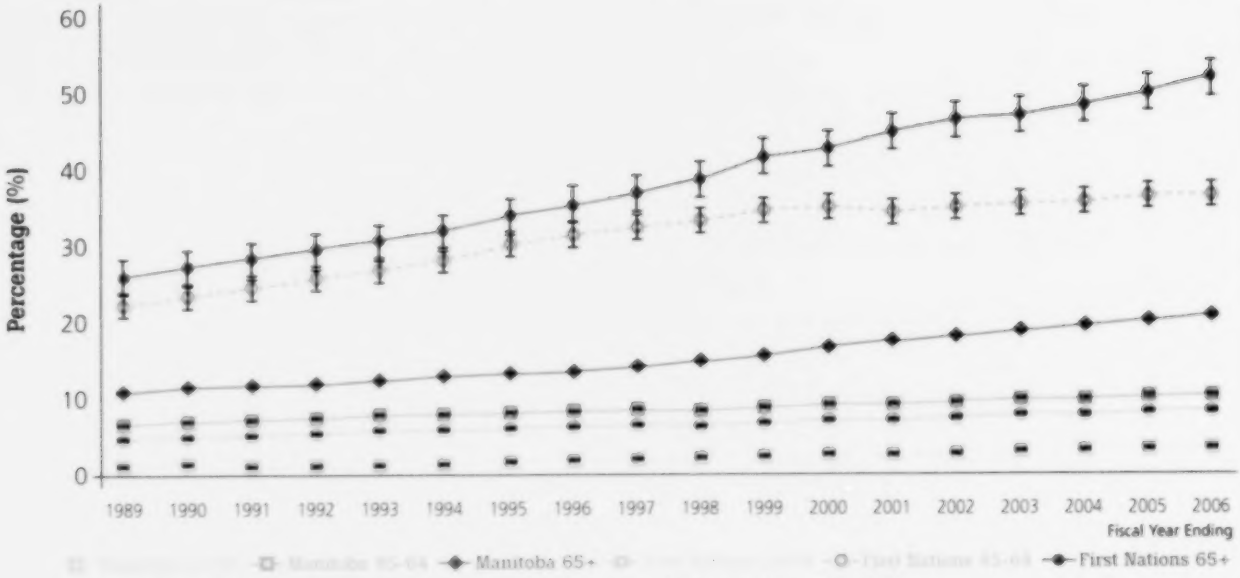


Note: The age specific diabetes prevalence rates for <20 years of age were less than 0.3%. There was no difference between male and female rates.

Figure 3: Age-group and Sex-specific Diabetes Prevalence Rates 1988/89 to 2005/06

- The prevalence of diabetes increases with age.
- Manitobans in the 45-to-64-year age group were about five times more likely to live with diabetes than those in the 20-to-44-year age group.
- Diabetes risk doubled again in the next age group, where Manitobans 65 years of age and older had almost 10 times higher prevalence of diabetes than those in the 20-to-44-year age group.
- The prevalence of diabetes has increased for all age groups between 1988/89 and 2005/06. The extent of increase was highest at 2.4 for those between 20 and 44 years old, whereas the other age groups less than doubled their rates.
- The differences in diabetes rates between male and female Manitobans increased for each age group between 1988/89 and 2005/06.
- Manitoba women ages 20 to 44 had higher diabetes prevalence rates than men in the same age group, with a difference increasing from 0.1% in 1988/89 to 0.3% in 2005/06. This difference started to be statistically significant in 1995/96.
- For the two older groups, Manitoba men had significantly higher diabetes prevalence rates than Manitoba women. The difference between men and women for the 45-to-64 year age group increased from 0.7% to 1.6%, and from 1.7% to 4.3% for the 65 years and older group between 1988/89 and 2005/06.

2.1.5 Age-group Specific Prevalence Rates by Status 1988/89 to 2005/06



Note: The age-specific diabetes prevalence rates for <20 years of age were lower than 0.6%.

Figure 4: Manitoba Age-specific Diabetes Prevalence Rates by Status 1988/89 to 2005/06

- The prevalence of diabetes in First Nations people was much higher than in Manitobans overall for each age group. It was about four times the rate for the 20-to-65-year groups, and about 2.5 times the rate for the group ages 65 years and older.
- The rate of increase was highest in First Nations people 65 years of age and older. It was increasing by about 1.5% per year from 25% (±2) in 1988/89 to 52% (±3) in 2006. The prevalence rate increase for Manitobans overall in the 65 years and older age group was about 0.6% per year.
- The rate of increase was almost as high for First Nations people between the ages of 45 and 64 years at about 1.3% per year between 1988/89 and 1996/97. After 1997, their prevalence rate has increased at about 0.6% per year. This was still twice the rate of increase (0.3%) for Manitobans overall.
- The rate of increase was lower in the younger age groups: for Manitobans overall aged 20 to 44 it was about 0.1% per year whereas in First Nations people it was about three times as high at 0.3% in the 20-to-44-year age group.
- Child and adolescent (one to 19 years old) diabetes prevalence rates before 1992/93 were less than 0.2%, with no differences between First Nations people and total rates. By 2005/06, diabetes prevalence in First Nations people younger than 20 years of age had tripled to 0.6% (±0.1) – double the total Manitoba rate.

2.1.6 Five-year Age-specific Rates 2005/06

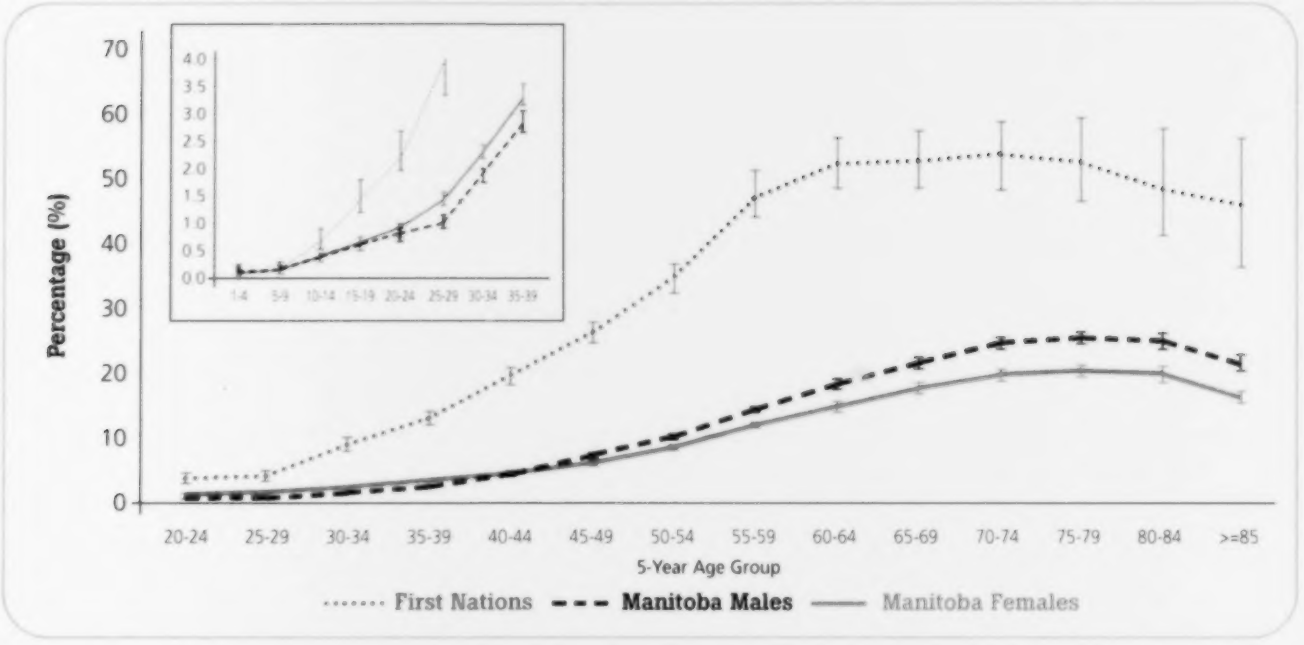
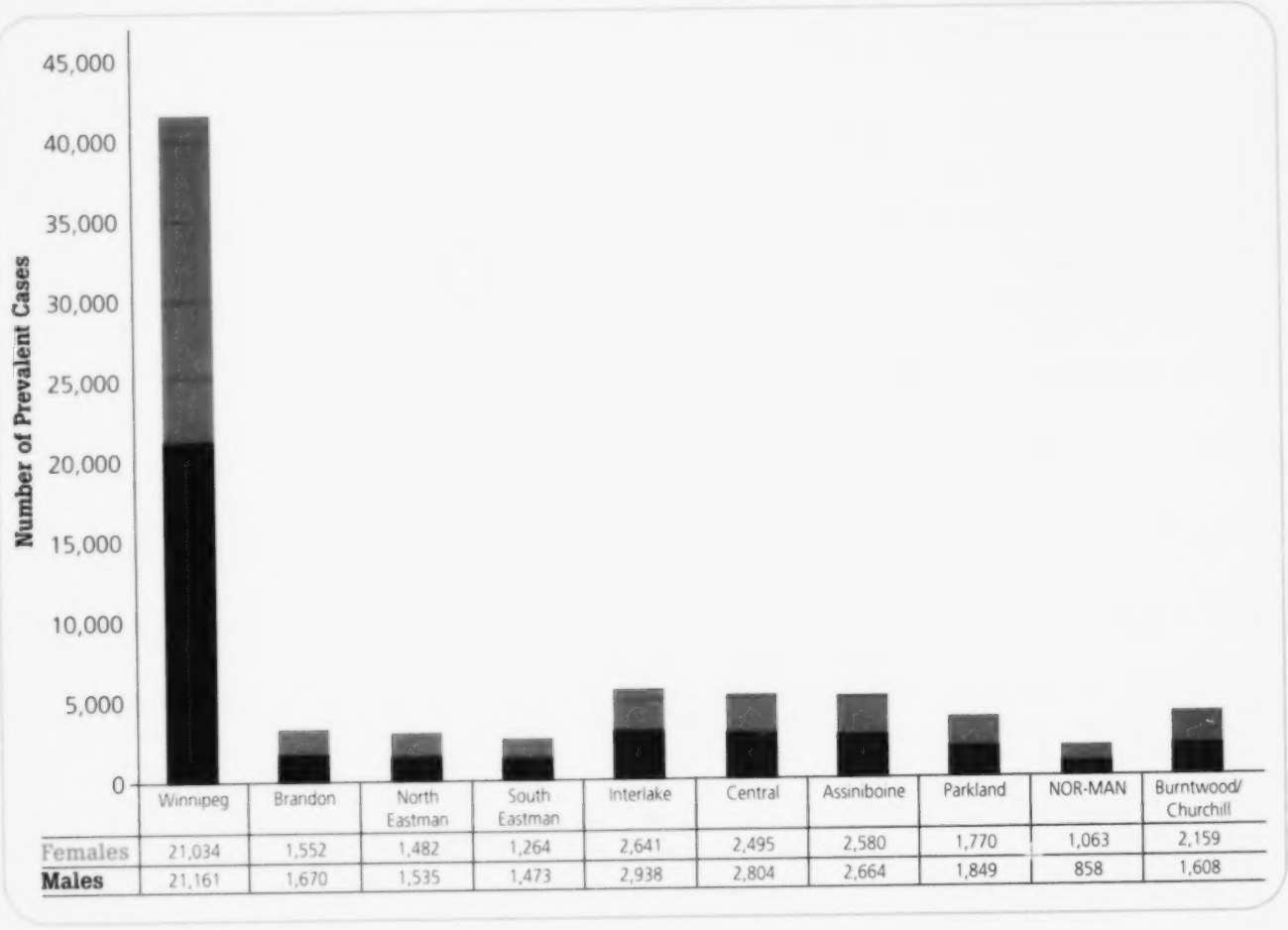


Figure 5: Manitoba Age-specific Diabetes Prevalence Rates 2005/06

- In 2005/06, young Manitoba women (ages 25 to 39 years) had significantly higher diabetes prevalence, by about 0.4%, than young Manitoba men.
- At ages 44 and older, diabetes prevalence in men is starting to be significantly higher than in women.
- Diabetes prevalence in 2005/06 was highest for Manitobans ages 70 to 84 years, at 20% for women and 24% for men.
- Diabetes prevalence rates in First Nations people start to be significantly higher than those of Manitobans overall by age 10.
- Diabetes prevalence in 2005/06 was highest for First Nations people between the ages of 60 to 79 years at 53%.

2.1.7 Prevalent Diabetes Cases in Regional Health Authorities 2005/06
Regional Prevalent Diabetes Cases



	Winnipeg	Brandon	North Eastman	South Eastman	Interlake	Central	Assiniboine	Parkland	NOR-MAN	Burntwood/ Churchill
Females	21,034	1,552	1,482	1,264	2,641	2,495	2,580	1,770	1,063	2,159
Males	21,161	1,670	1,535	1,473	2,938	2,804	2,664	1,849	858	1,608

Figure 6: Diabetes Cases by Region and Sex 2005/06

- The proportion of female diabetes cases was lowest in South Eastman (46.2%) and Central (47.1%).
- The proportion of female diabetes cases was highest in NOR-MAN (55.3%) and Burntwood/Churchill (57.3%).

Regional Diabetes Prevalence Rates

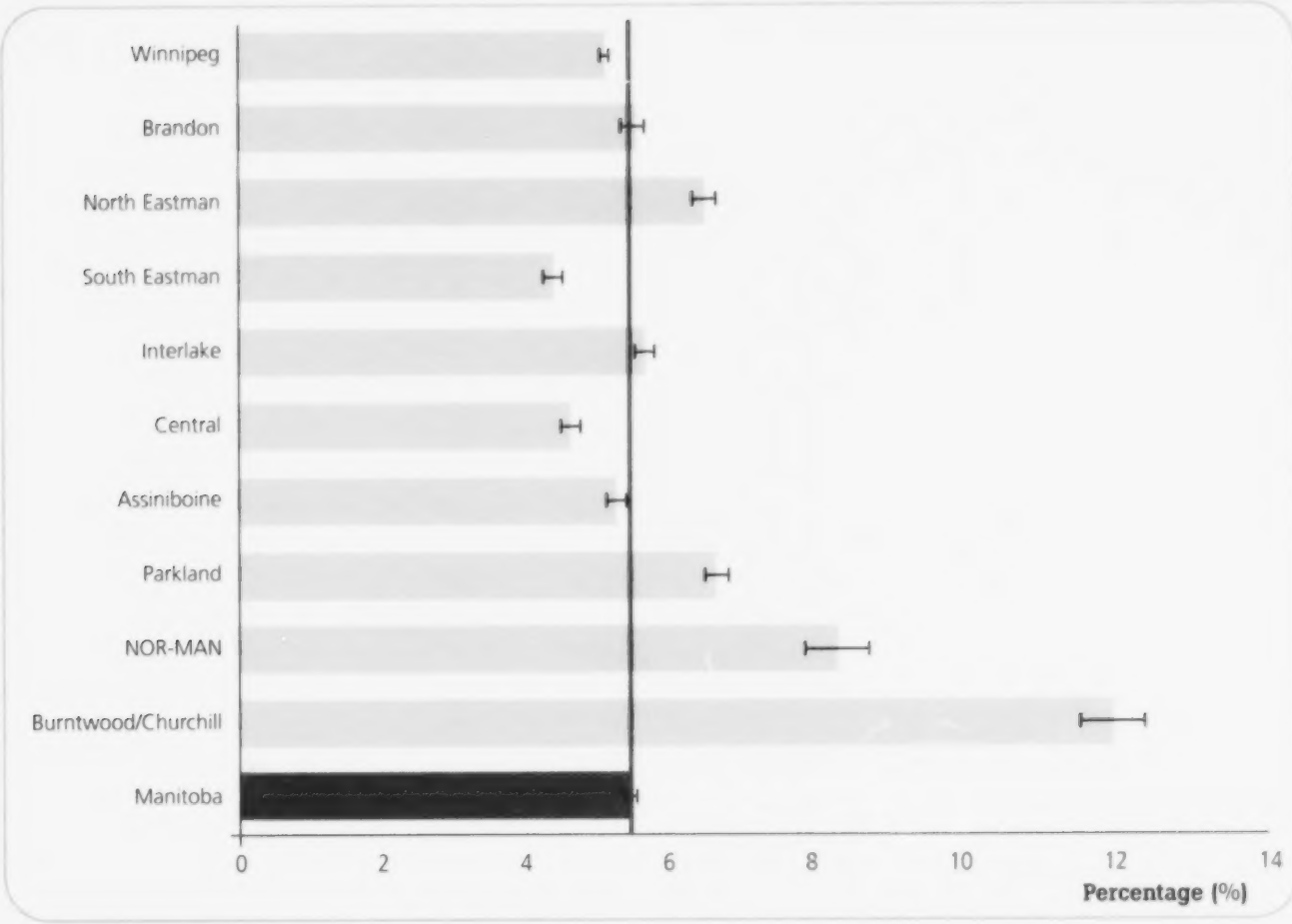


Figure 7: Age-adjusted Diabetes Prevalence Rates by Region 2005/06

- 2005/06 unadjusted diabetes prevalence rates ranged from 4.5% in South Eastman, to 8.5% in Parkland, indicating an uneven distribution of diabetes in Manitoba.
- Age-adjusted diabetes prevalence rates were significantly higher than the Manitoba rate in Burntwood/Churchill, NOR-MAN, Parkland, North Eastman and Interlake regions. They were significantly lower in Winnipeg, Central and South Eastman regions.
- Significantly higher age-adjusted prevalence rates are associated with regions that had more than 13% of First Nations people among their population with diabetes, compared to 10.7% in Manitoba overall.

Regional Diabetes Prevalence by Sex

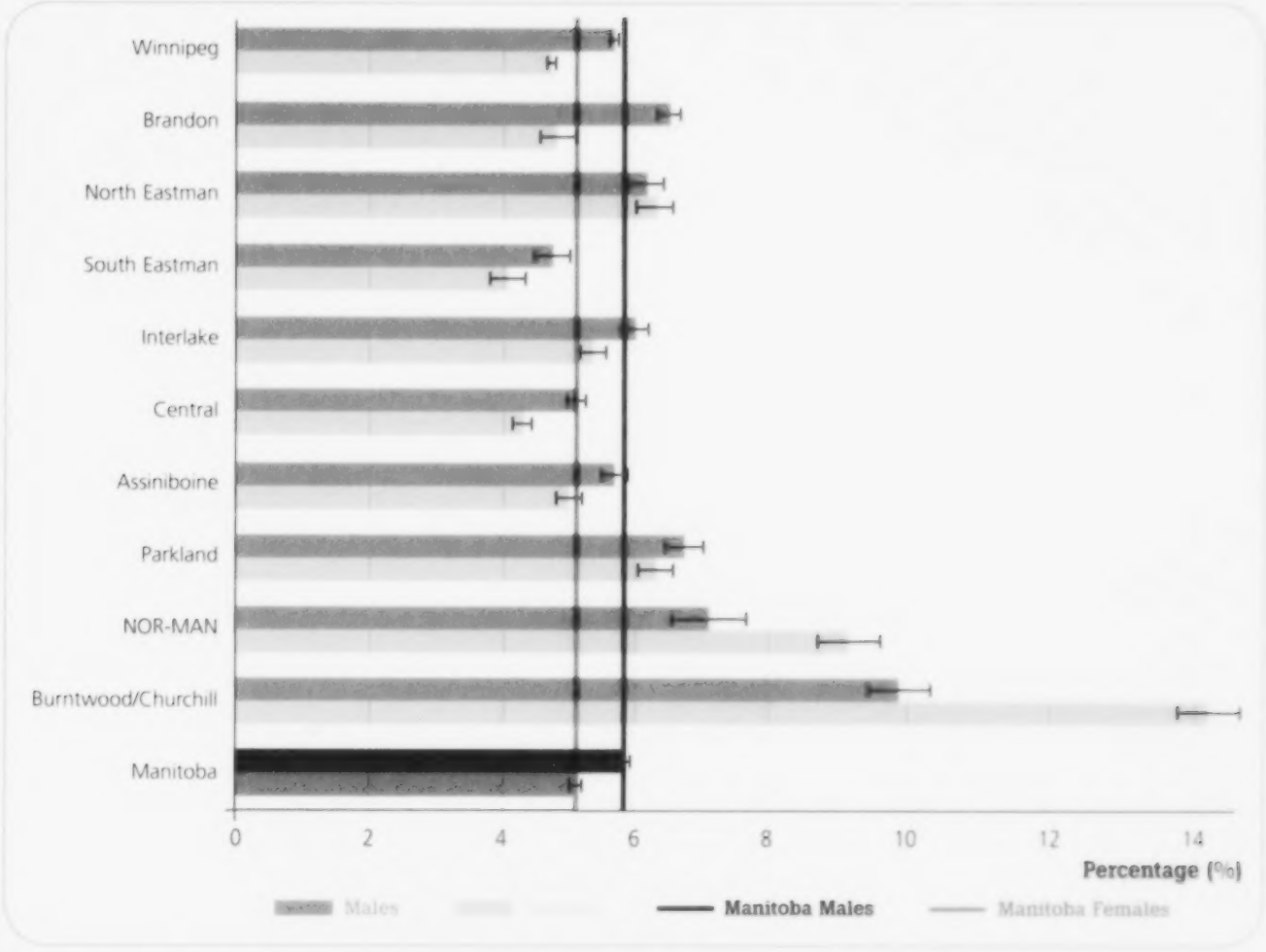


Figure 8: Age-adjusted Prevalence Rates by Region and Sex 2005/06

- Similar to Manitoba overall, most regions had significantly higher male than female diabetes age-adjusted prevalence rates in 2005/06.
- The exceptions were northern regions with the highest diabetes prevalence rates overall: Burntwood/Churchill and NOR-MAN had significantly higher female than male prevalence rates. Parkland and North Eastman regions showed no significant differences between male and female prevalence rates in 2005/06.
- Brandon had a significantly higher male diabetes prevalence rate than Manitoba in 2005/06, but also a significantly lower female prevalence rate than the Manitoba rate.

Regional Diabetes Prevalence by First Nations People

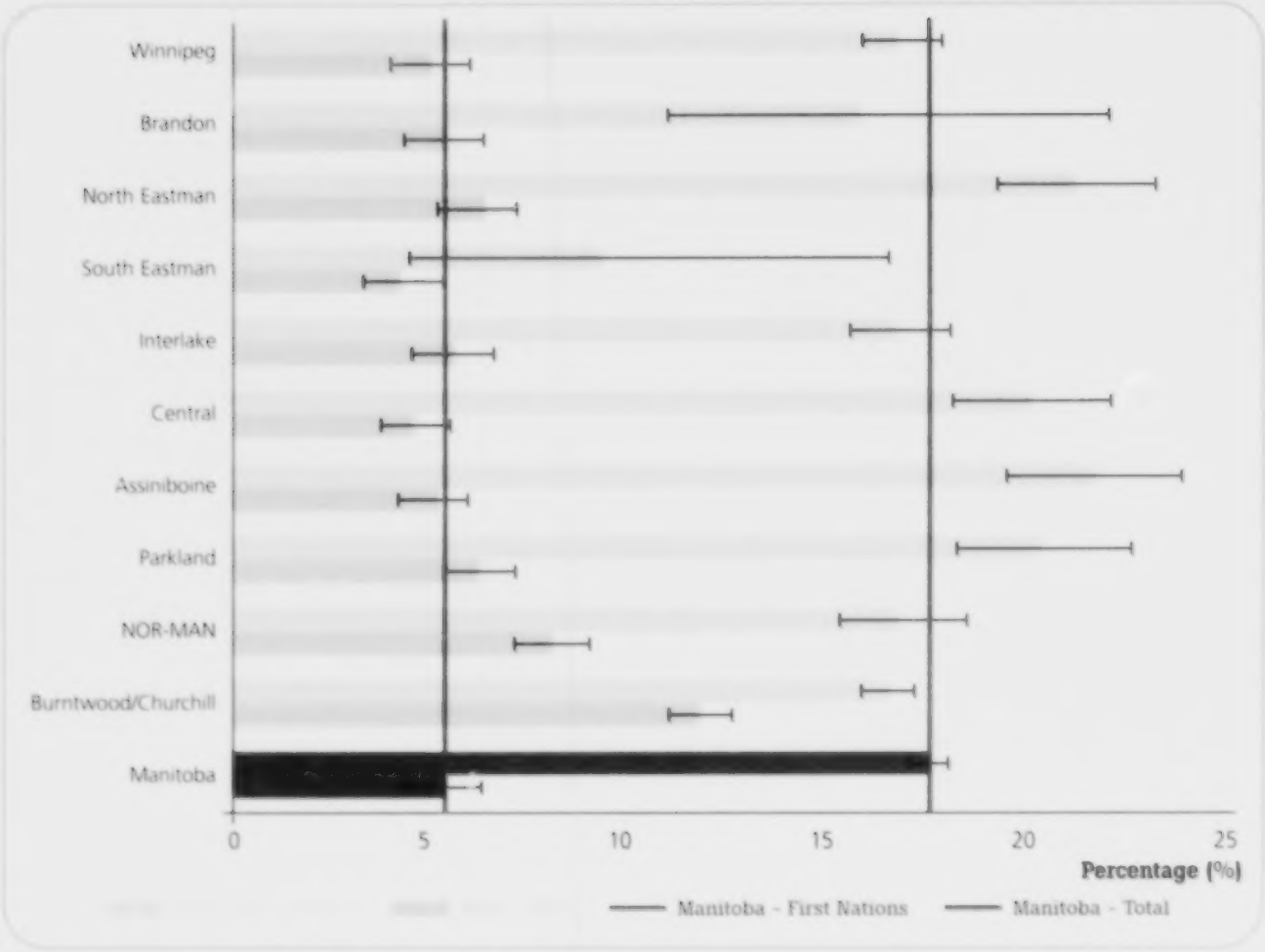


Figure 9: Age-adjusted Prevalence Rates by Region and Status 2005/06

- The age-adjusted diabetes prevalence was significantly higher for First Nations people than for the total population in all Manitoba regions.
- Age-adjusted diabetes prevalence rates for regional First Nations people were significantly higher in North Eastman, Central, Assiniboine and Parkland regions than for the Manitoba First Nations people overall.
- Age-adjusted prevalence rates for regional First Nations people were significantly lower in Burntwood/Churchill and South Eastman regions than for the Manitoba First Nations population overall.

2.1.8 Key Results

- Manitoba has experienced a considerable growth in the number of people one year of age and older with diabetes from 32,468 (or one in 36) in 1989 to 76,608 (or one in 16) in 2006.
- In 2006 the age-adjusted diabetes prevalence rate was 5.5% (ages one year and older). It has doubled from 2.8% in 1989.
- The prevalence of diabetes in First Nations people was much higher (one in 10) than in Manitobans overall for each age group. It was at about four times the rate for 20-to-65 years of age, and about 2.5 times the rate for the group ages 65 years and older.
- Diabetes prevalence in 2006 was highest for 70-to-84-year-old Manitobans at 20% for women and 24% for men.
- Diabetes prevalence in 2006 was highest for First Nations people between the ages of 60 and 79 years, at 53%.

2.2 Incidence of Diabetes in Manitoba

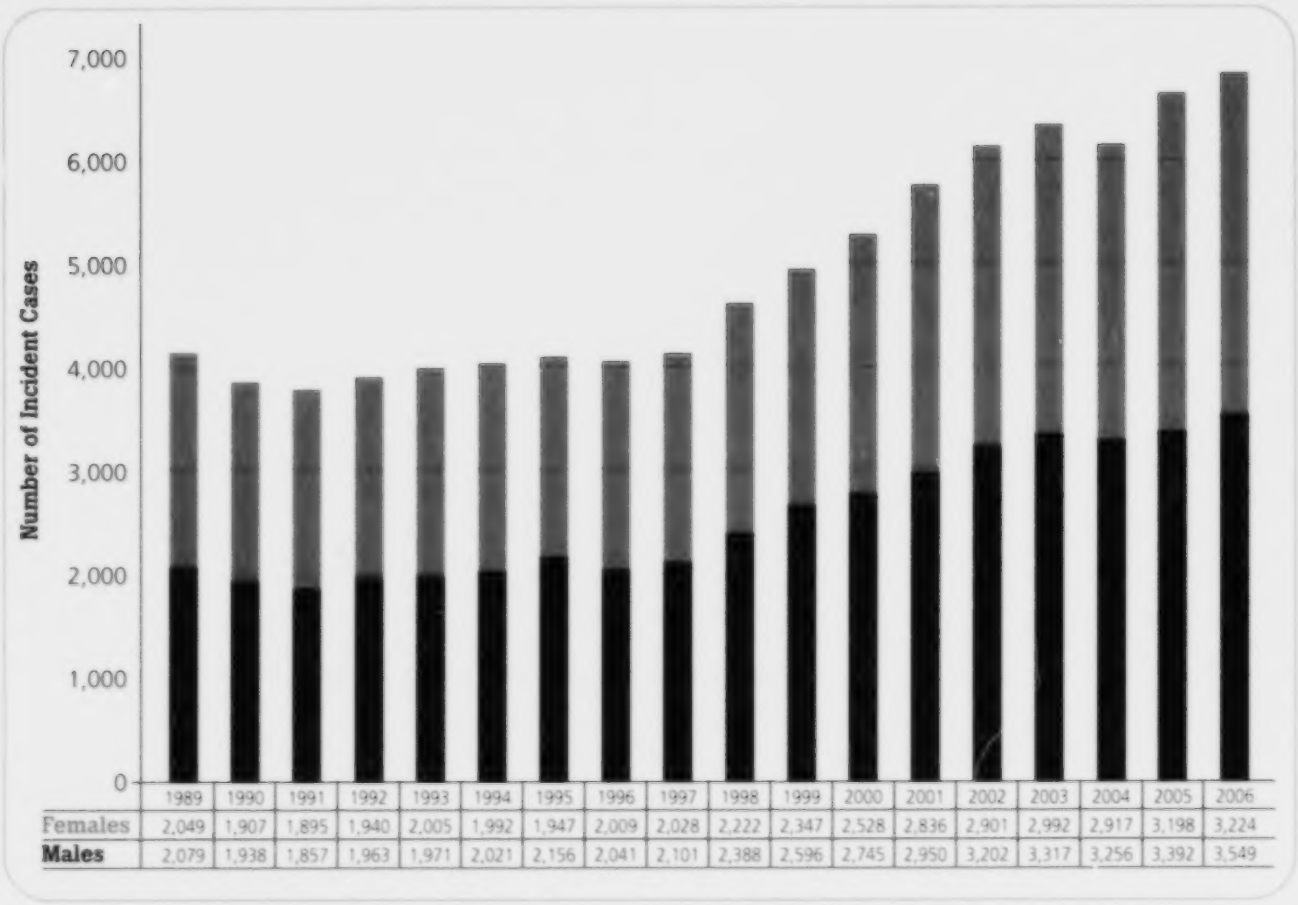
2.2.1 Definition

"Incidence" is defined as the number of new cases detected in the population at risk for the disease during a specific period. "Diabetes incidence" is defined as the rate of new cases occurring within the population during the fiscal year (April 1 – March 31). It is calculated as follows:

$$\text{Incidence Rate} = \frac{\text{Total number of people with a diabetes case date in the current fiscal year}}{\text{Total population count for the current fiscal year minus prevalent cases minus incident cases}} \times 1{,}000$$

The denominator uses the count for the entire year rather than the mid-year estimate. It includes people who migrate or die during the year, since they are included in the numerator. New cases arise sporadically and create volatility in the rates for small populations, so five-year averages are used to smooth out the fluctuation in the age-specific rates.

2.2.2 Incident Diabetes Cases 1988/89 to 2005/06



	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Females	2,049	1,907	1,895	1,940	2,005	1,992	1,947	2,009	2,028	2,222	2,347	2,528	2,836	2,901	2,992	2,917	3,198	3,224
Males	2,079	1,938	1,857	1,963	1,971	2,021	2,156	2,041	2,101	2,388	2,596	2,745	2,950	3,202	3,317	3,256	3,392	3,549

Figure 10: Manitoba New Diabetes Cases (one year and older) 1988/89 to 2005/06

- The numbers of annual new diabetes cases were relatively constant between 1988/89 and 1996/97, but started to increase sharply in 1997/98.
- The proportion of new female diabetes cases has gradually declined from 49.6% in 1988/89 to 47.6% in 2005/06.
- The number of new cases has increased by about 63% from a five-year average of 3,920 per year between 1988/89 and 1992/93 (or 3.5 per 1,000 Manitobans) to 6,390 per year between 2001/02 and 2005/06 (or 5.7 new cases per 1,000 Manitobans).
- This jump in the number and rate of new diabetes diagnoses is partially attributable to the publication of new criteria for screening and diagnosis of diabetes in 1998 by the Canadian Diabetes Association. Therefore, interpretation of these incidence data must be interpreted with this caveat in mind.

2.2.3 Diabetes Incidence Rates 1988/89 to 2005/06

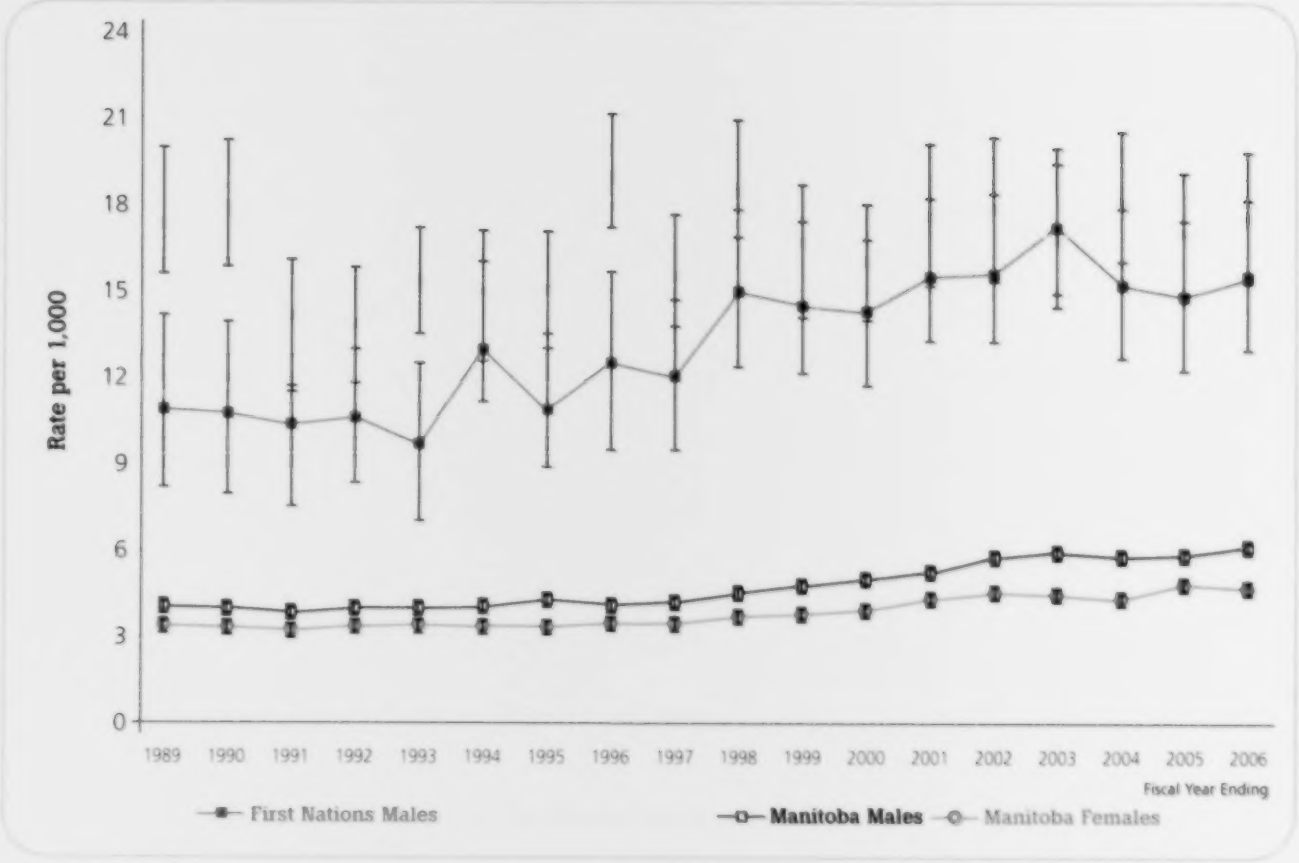


Figure 11: Age-adjusted Diabetes Incidence Rates 1988/89 to 2005/06

- In the fiscal year ending in 2006, the unadjusted diabetes incidence rate was six per 1,000 (ages one year and older) in Manitoba. This has increased by 50% from four per 1,000 in 1988/89.
- For Manitoba overall, the age-adjusted male diabetes incidence rate has been higher than the female rate. The difference increased from 0.6 per 1,000 in 1988/89 to 1.2 per 1,000 in 2005/06.
- Diabetes incidence was highest in First Nations females at 18 per 1,000 (±2.5) in 2005/06. This is more than three times the incidence rate of five per 1,000 in Manitoba females when adjusted for age.
- For First Nations males, the diabetes incidence rate was almost three times higher than in Manitoba males.
- For Manitoba First Nations people, the age-adjusted diabetes incidence rate in females was higher than in males in most years. The difference between male and female incidence rates has gradually decreased from about seven per 1,000 in 1988/89, to two per 1,000 by 2005/06.

2.2.4 Age-group and Sex-specific Incidence Rates 1988/89 to 2005/06

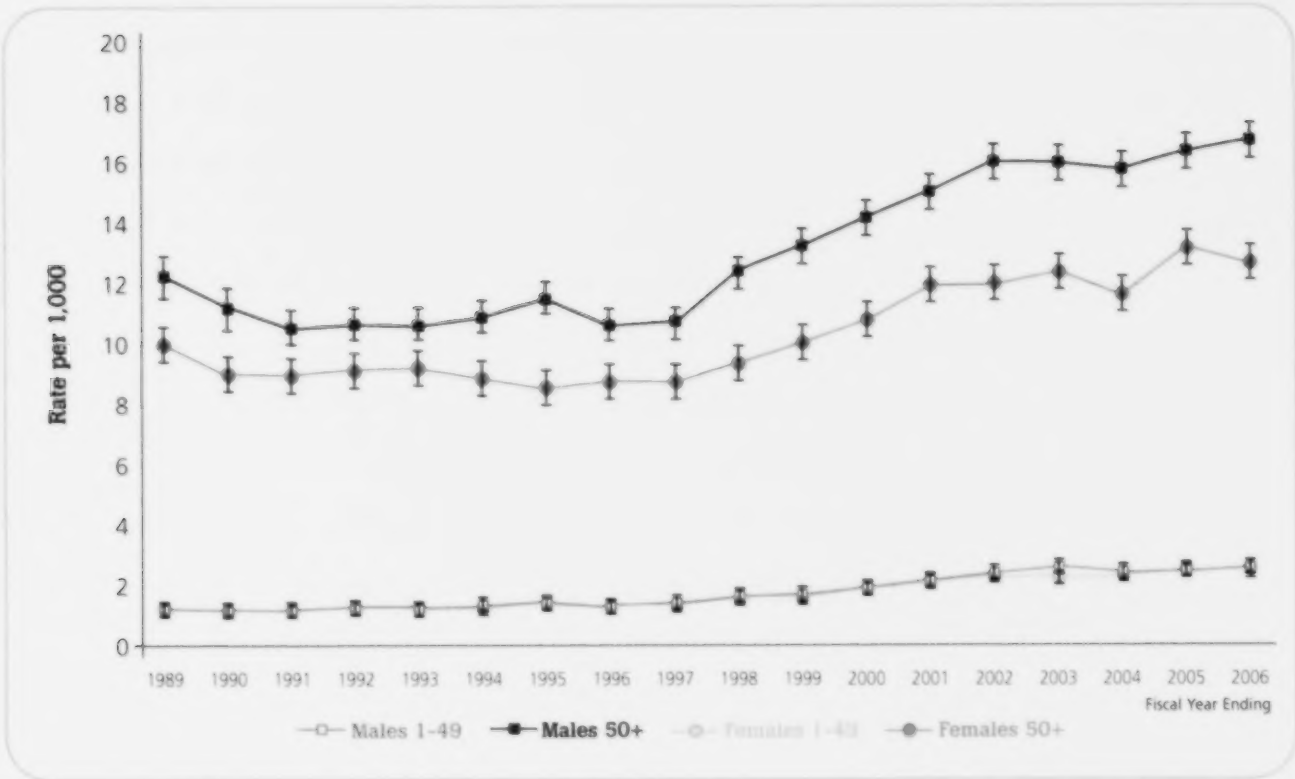


Figure 12: Age-group and Sex-specific Diabetes Incidence Rates 1988/89 to 2005/06

- The incidence of diabetes increases with age.
- The diabetes incidence rate of Manitoba men 50 years of age and older varied between about 10 and 12 per 1,000 from 1988/89 to 1996/97. After 1998, the incidence rate increased to an average of 16 per 1,000 from 2001/02 to 2005/06.
- The diabetes incidence rate of Manitoba women 50 years of age and older varied between about eight-and-10 per 1,000 from 1988/89 to 1996/97. After 1997/98, the incidence rate increased to an average of 12 per 1,000 from 2001/02 to 2005/06.
- This jump in the rate of new diabetes diagnoses was likely associated with the publication of new criteria for screening and diagnosis of diabetes in 1998.
- For Manitobans between one and 49 years of age, the rate of new diabetes cases has gradually doubled, from 1.2 per 1,000 in 1989/90 to 2.5 per 1,000 in 2002/03. This rate increase roughly parallels rising obesity rates in Manitoba in the 1980s and 1990s, when the proportion of adults with a Body Mass Index higher than 27 more than doubled, from about 16% in 1985 to 36% in 2001.
- Diabetes incidence rates for male and female Manitobans younger than 50 years old are virtually identical.

2.2.5 Age-group Specific Incidence Rates by Status 1988/89 to 2005/06

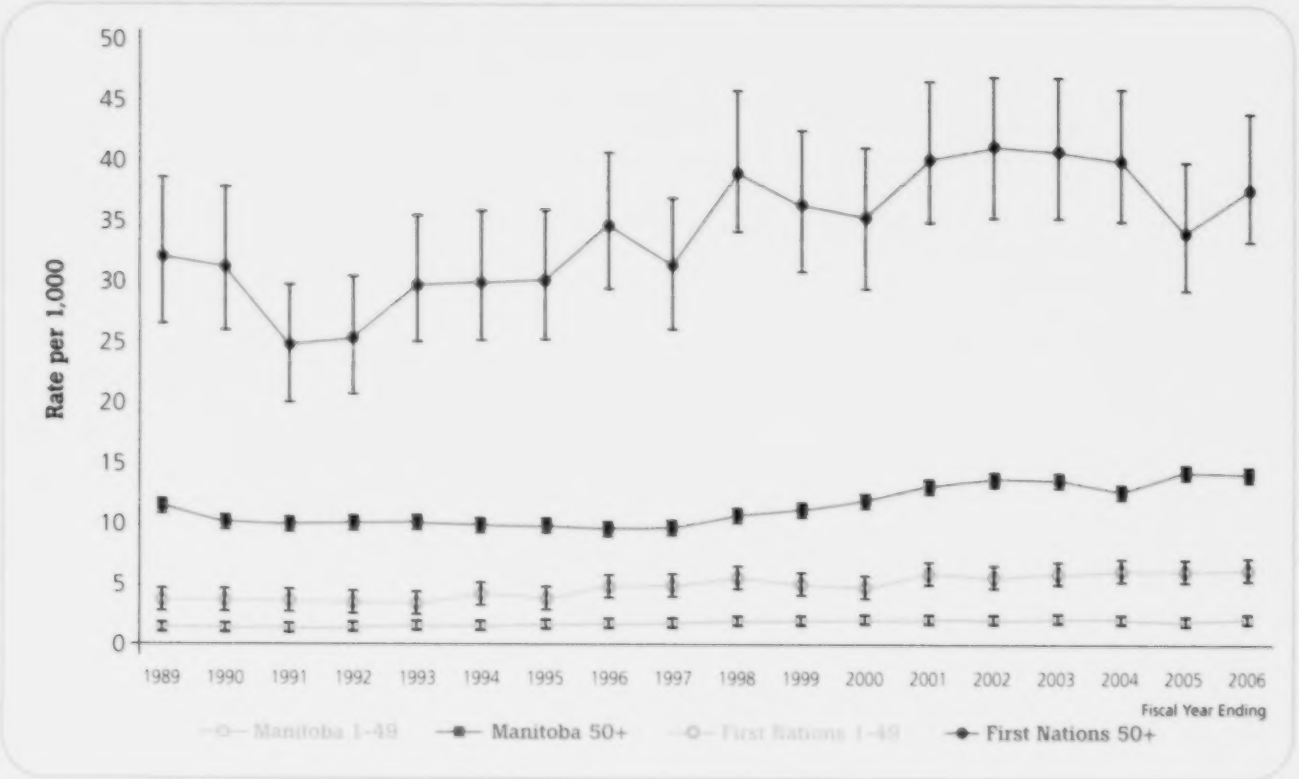


Figure 13: Manitoba Age-specific Diabetes Incidence Rates by Status 1988/89 to 2005/06

- First Nations people were about three times more likely to be diagnosed with diabetes in any year compared to Manitobans overall.
- Annual diabetes incidence rates for First Nations people 50 years of age and older are very variable. Average five-year rates have increased significantly from 29 per 1,000 (±2) in 1988/89 and 1992/93 to 39 per 1,000 (±2) between 2001/02 and 2005/06.
- Overall annual diabetes incidence rates for Manitobans 50 years of age and older were almost constant at around 10 per 1,000 from 1988/89 to 1996/97. They have increased to almost 15 per 1,000 between 1988/89 and 2005/06.
- Diabetes incidence rates of Manitobans younger than 50 years old have been increasing gradually.

2.2.6 Five-year Age-specific Rates, 2002 to 2006

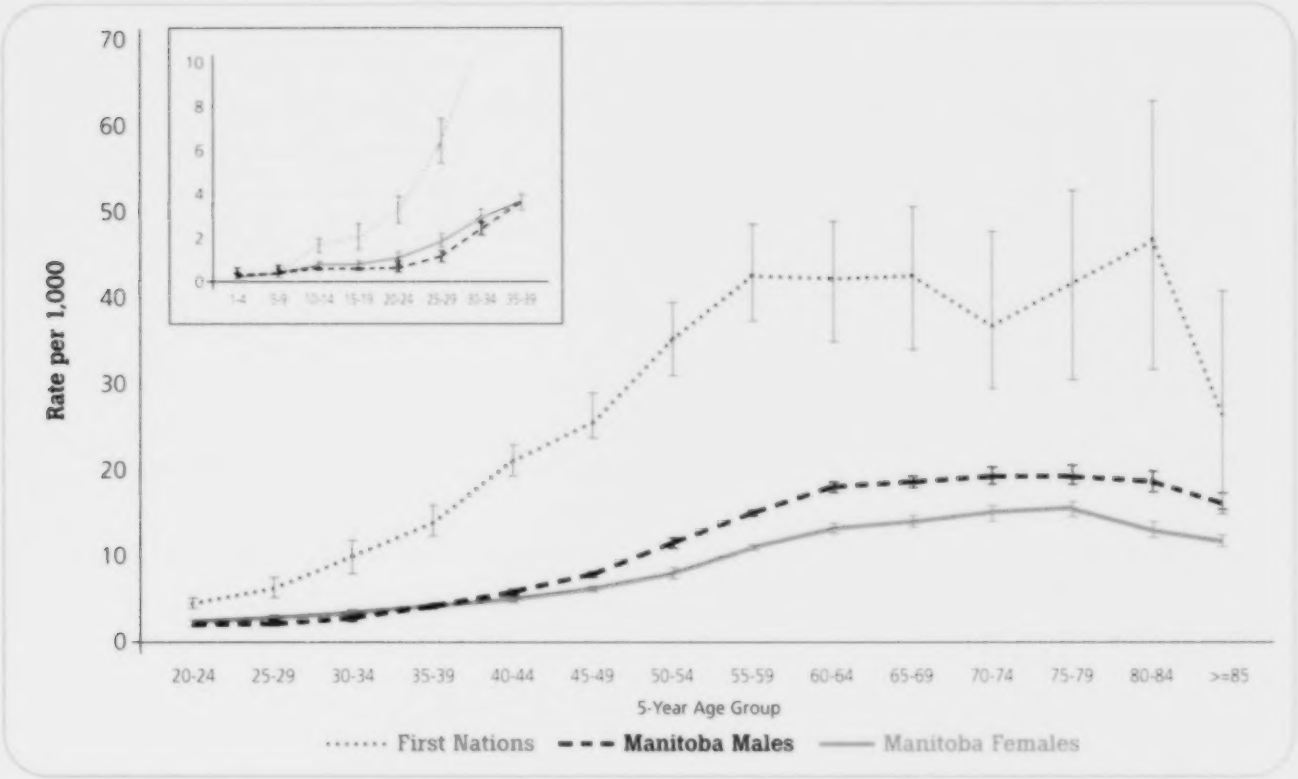
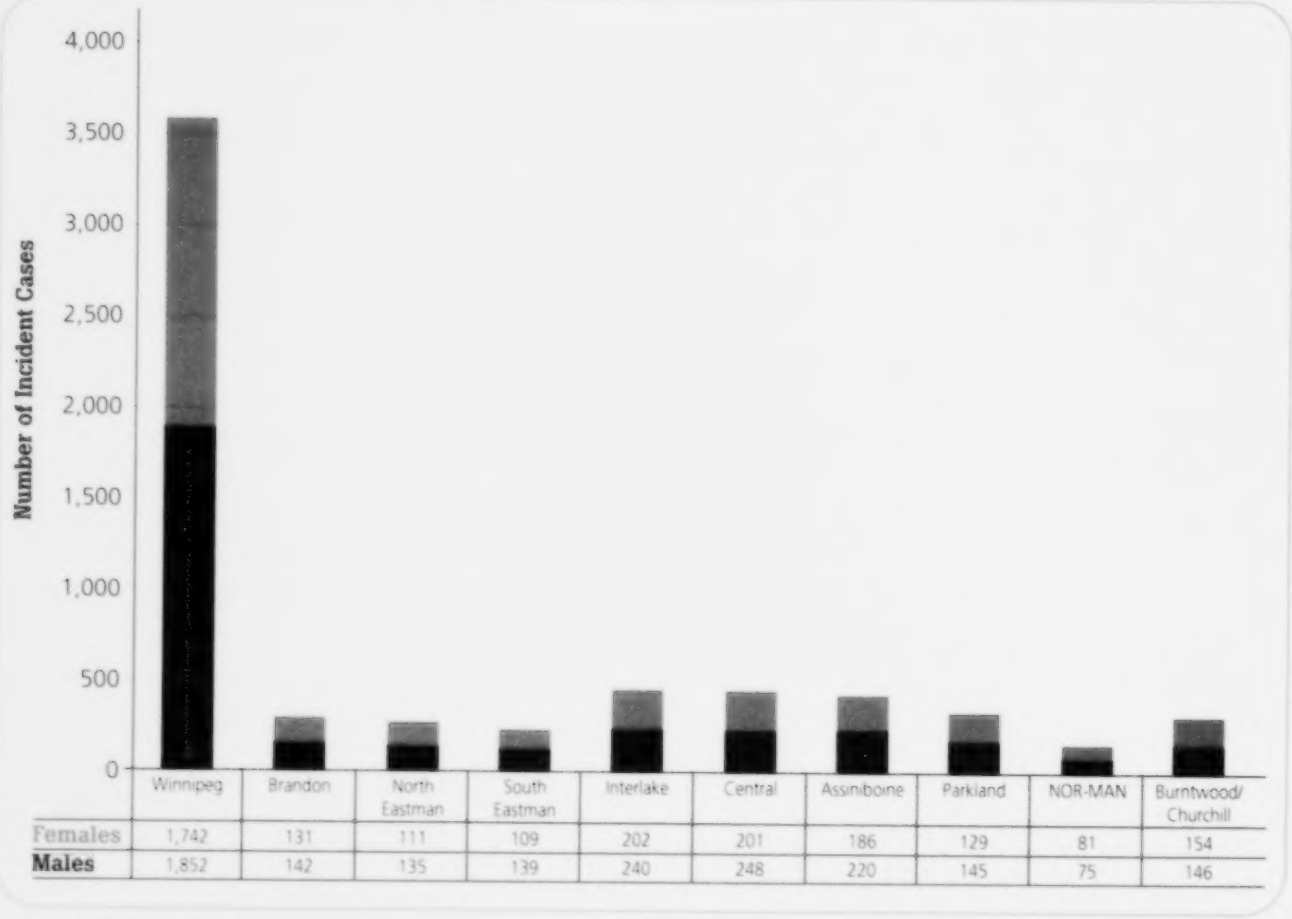


Figure 14: Manitoba Age-specific Diabetes Incidence Rates 2001/02 to 2005/06

- Between 2001/02 and 2005/06, young Manitoba women (20 to 34 years old) had significantly more incident cases by about 0.5 per 1,000 than young Manitoba men. This may include unidentified gestational diabetes.
- After the age of 40, diabetes incidence rates in men begin to exceed those of women.
- Diabetes incidence was highest for Manitobans ages 65 to 79 years, at 15 per 1,000 for women and 20 per 1,000 for men.
- Diabetes incidence rates in First Nations people start to be significantly higher than those of Manitobans overall by age 10.
- Diabetes incidence was highest for 55-to-84-year-old First Nations people, at about 42 per 1,000.

2.2.7 New Diabetes Cases in Regional Health Authorities 2002 to 2006

Regional Incident Diabetes Cases



	Winnipeg	Brandon	North Eastman	South Eastman	Interlake	Central	Assiniboine	Parkland	NOR-MAN	Burntwood/ Churchill
Females	1,742	131	111	109	202	201	186	129	81	154
Males	1,852	142	135	139	240	248	220	145	75	146

Figure 15: Average Number of New Diabetes Cases by Region 2001/02 to 2005/06

- All regions except NOR-MAN and Burntwood/Churchill had a higher average number of new male diabetes cases than new female diabetes cases.
- The proportion of new female diabetes cases was lowest in South Eastman (43.8%) and Central (44.8%) regions.
- The proportion of new female diabetes cases was highest in NOR-MAN (51.9%) and Burntwood/Churchill (51.3%) regions.

Regional Diabetes Incidence Rates

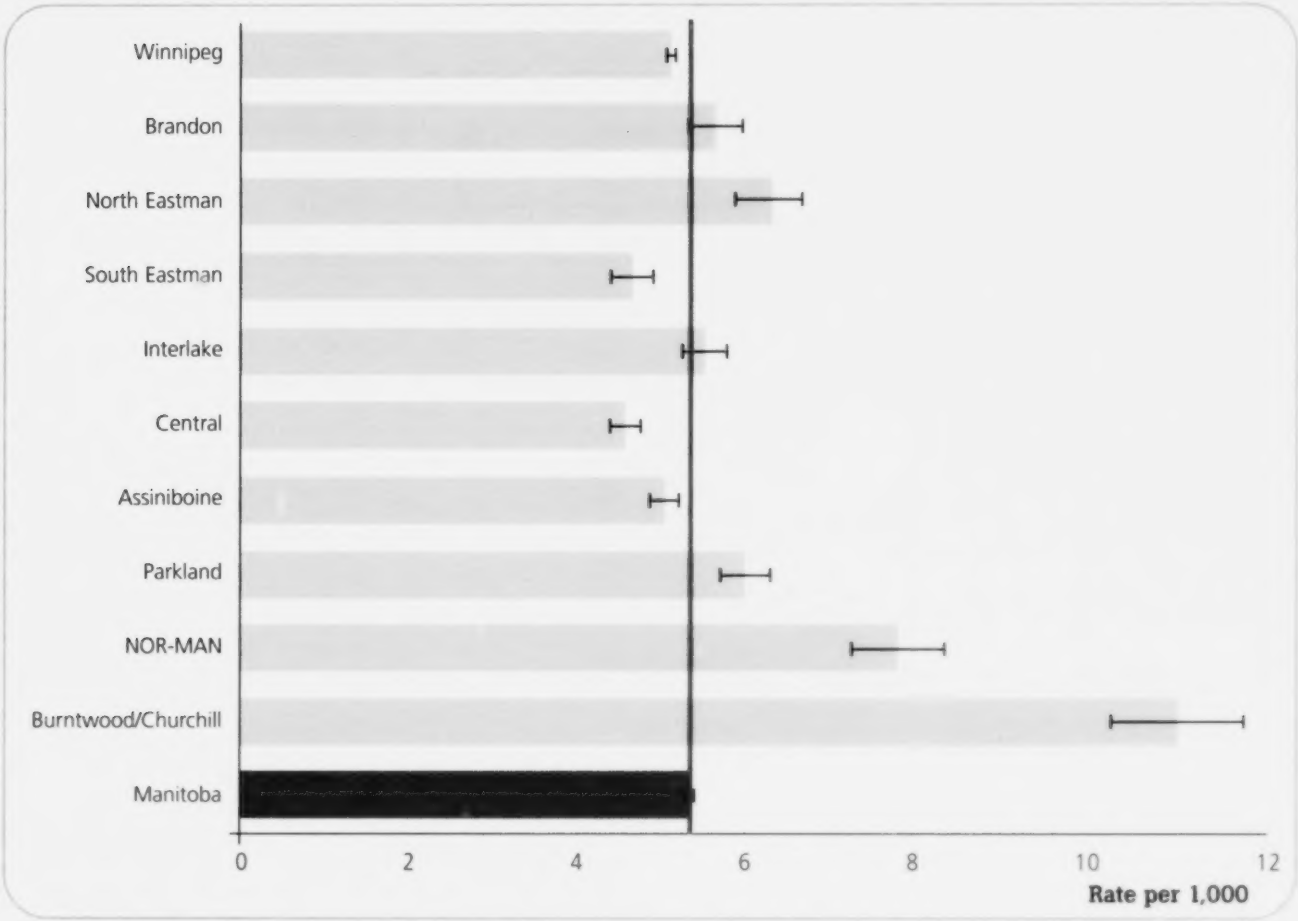


Figure 16: Age-adjusted Diabetes Incidence Rates by Region 2001/02 to 2005/06

- 2001/02 to 2005/06 average age-adjusted diabetes incidence rates ranged from 4.6 per 1,000 (±0.2) in Central region to 10.9 per 1,000 (±0.7) in Burntwood/Churchill.
- 2001/02 to 2005/06 average age-adjusted diabetes incidence rates were significantly higher than the Manitoba rate in Burntwood/Churchill, NOR-MAN, Parkland, and North Eastman and Brandon regions. They were significantly lower in Winnipeg, Assiniboine, Central, and South Eastman regions.
- The regional distribution of average incidence rates is similar to the prevalence rate distribution described earlier. **(See Figure 7)**.

Regional Diabetes Incidence by Sex

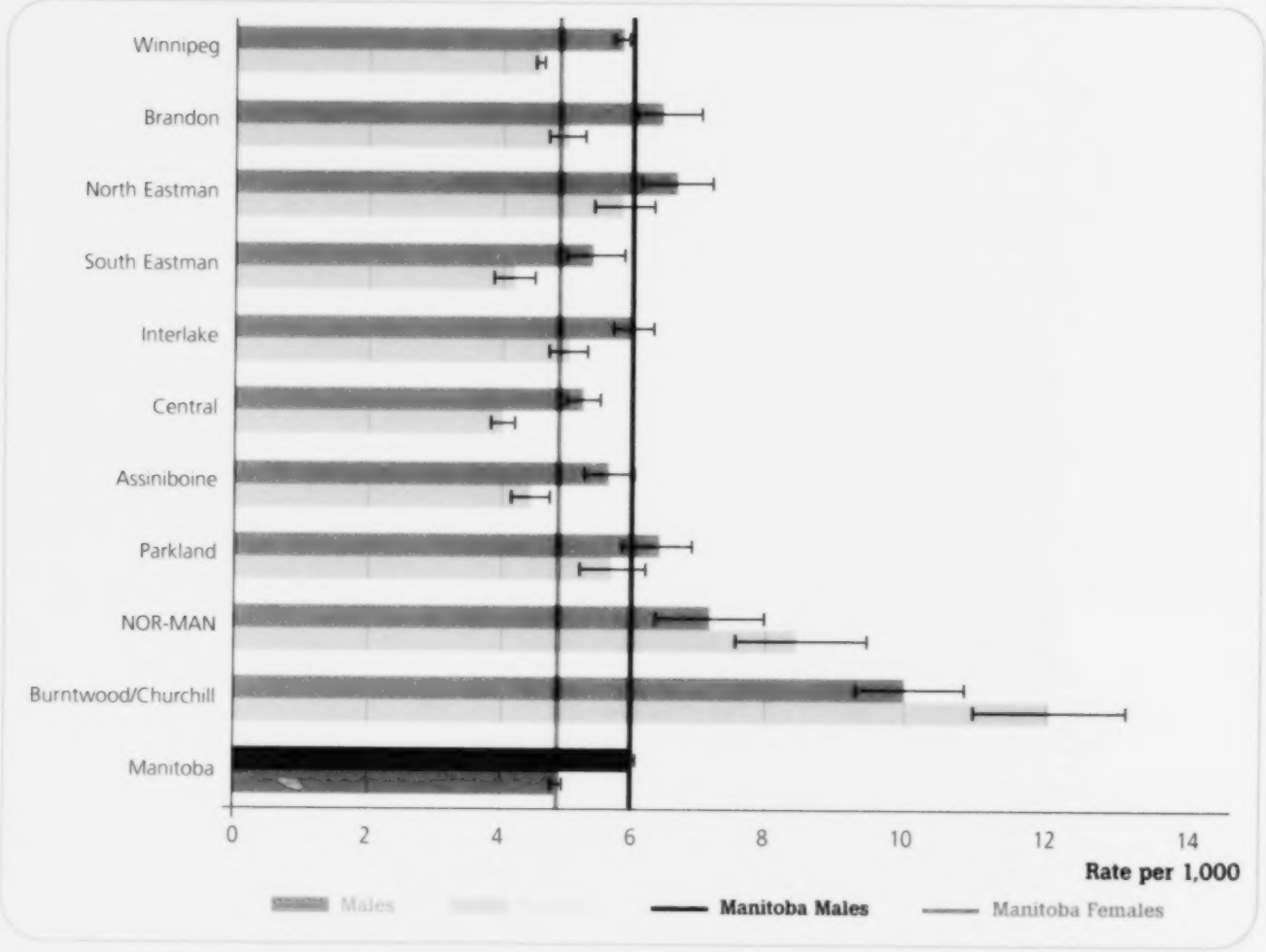


Figure 17: Age-adjusted Incidence Rates by Region and Sex 2001/02 to 2005/06

- Similar to Manitoba overall, most regions had significantly higher diabetes rates in men than women.
- The exceptions were two northern regions with the highest diabetes incidence rates overall: Burntwood/Churchill and NOR-MAN had higher incidence rates in women than men.

Regional Diabetes Incidence by First Nations People

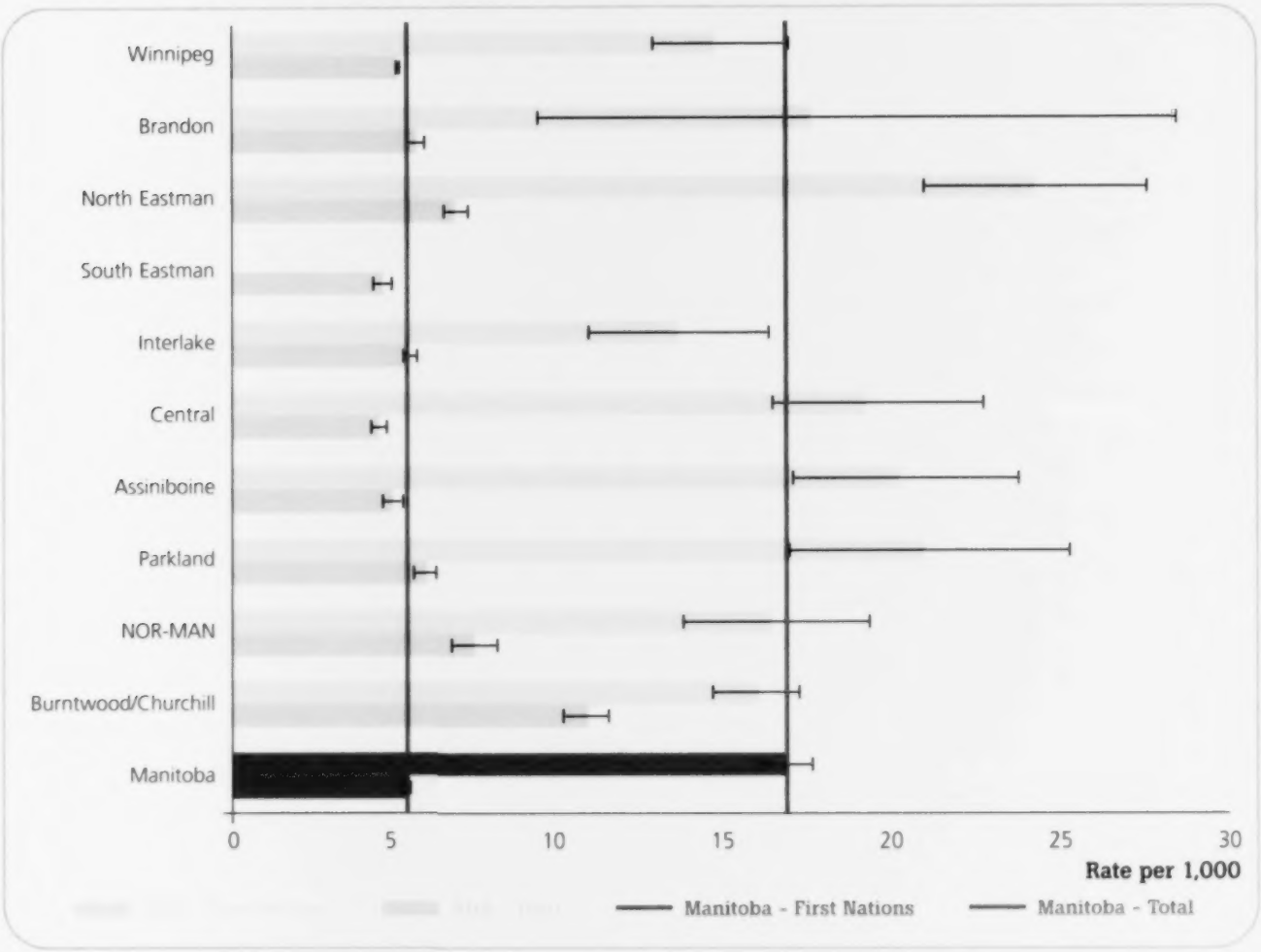


Figure 18: Age-adjusted Incidence Rates by Region and Status 2001/02 to 2005/06

- The 2001/02 to 2005/06 age-adjusted diabetes incidence rates were significantly higher for First Nations people than for the total population in most Manitoba regions.
- Age-adjusted incidence rates were significantly higher for First Nations people living in North Eastman, Assiniboine and Parkland regions, than for the Manitoba First Nations population overall.
- Age-adjusted incidence rates were significantly lower for First Nations people living in Interlake than for the Manitoba First Nations people overall.

2.2.8 Key Results

- The number of new diabetes cases has almost doubled from a five-year average of 3,920 per year between 1989 and 1993, to 6,390 per year between 2002 and 2006.
- In 2006, the age-adjusted diabetes incidence rate was six per 1,000 (ages one year and older) in Manitoba. It has increased by 50% from four per 1,000 in 1989.
- First Nations people were about three times more likely to be diagnosed with diabetes in any year compared to Manitobans overall.
- Diabetes incidence between 2002 and 2006 was highest for Manitobans ages 65 to 79 years. It was 15 per 1,000 for women and 20 per 1,000 for men.
- Diabetes incidence between 2002 and 2006 was highest for First Nations Manitobans between the ages of 55 to 84 years, at about 42 per 1,000.

Consequences of Diabetes

3 Consequences of Diabetes

3.1 Diabetes Mortality

3.1.1 Definition

The **"mortality rate"** defines the proportion of a population who die of a disease, or of all causes. This measure can refer either to deaths due to diabetes or to deaths of people with diabetes. NDSS mortality analyses are based on **ALL** causes of death and not just deaths due to diabetes. This is because reliable information on cause of death is not available in the current data sources.

In NDSS, the mortality rate is calculated as the death rate over one fiscal year, with the denominator being the health insurance registry population aged 20 years and over. Regardless of the underlying cause of death, when an individual who has been diagnosed with diabetes dies, the death is recorded as a death of an individual with diabetes. Mortality rates are calculated for the population with diabetes and for the population without diabetes. The diabetes mortality rate ratio reflects the increased relative risk of death in the population with diabetes compared to the population without diabetes. Mortality rates and rate ratios are calculated as follows:

$$\text{Mortality rate (with diabetes)} = \frac{\text{Total number of deaths among people with diabetes during the current fiscal year}}{\text{Total number of people with diabetes during the current fiscal year}} \times 1{,}000$$

$$\text{Mortality rate (without diabetes)} = \frac{\text{Total number of deaths among people without diabetes during the current fiscal year}}{\text{Total number of people without diabetes during the current fiscal year}} \times 1{,}000$$

$$\text{Mortality rate ratio} = \frac{\text{Mortality rate among people with diabetes}}{\text{Mortality rate among people without diabetes}}$$

Deaths in children and adolescents are relatively rare and, therefore, all mortality rate information is reported for the 20-years-and-older age group.

3.1.2 Diabetes Mortality Rates 1988/89 to 2005/06

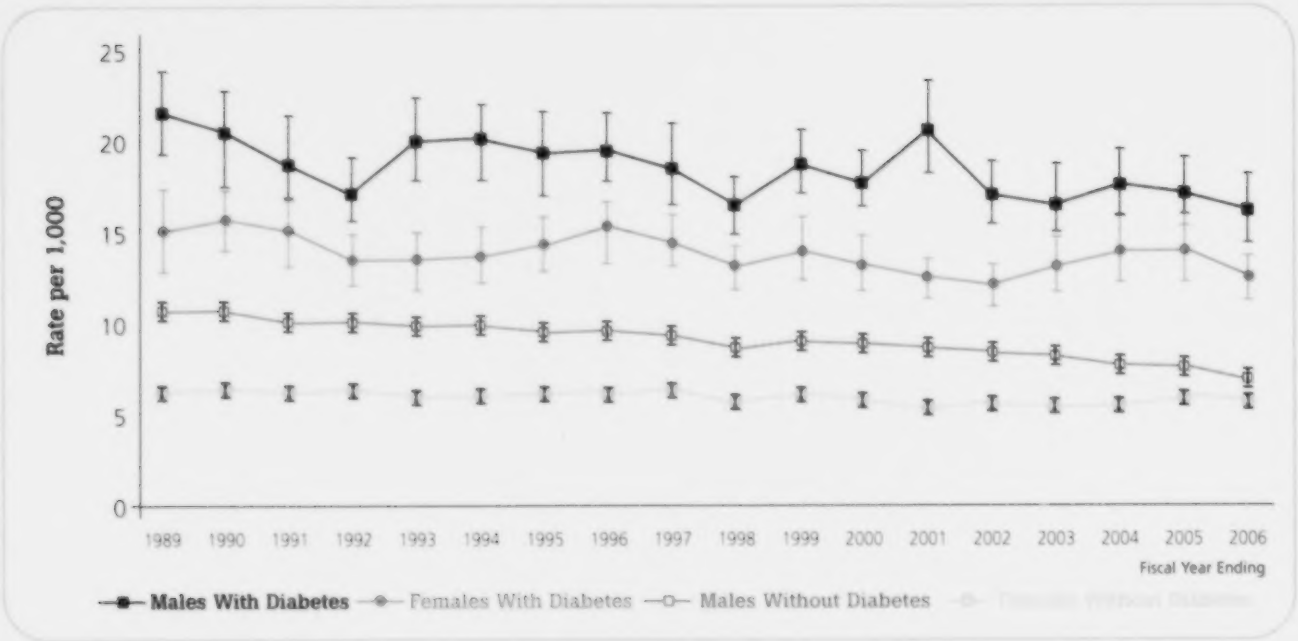


Figure 19: Manitoba Age-adjusted Mortality Rates (20 years and older) by Sex 1988/89 to 2005/06

- The average number of deaths of Manitobans with diabetes has increased from about 1,579 per year between 1988/89 and 1992/93 to about 2,540 diabetes-related deaths between 2001/02 and 2005/06. They accounted for about one quarter (27%) of all Manitoba deaths in adults (9,527 per year) in each year.
- While the number of deaths of people with diabetes in Manitoba has been increasing, the annual rate of death has been declining. It has gone from an average of about 17 deaths per 1,000 diabetes cases, between 1988/89 and 1992/93, to 15 deaths per 1,000 diabetes cases, between 2001/02 and 2005/06. This decrease may be associated with improved care aimed at circulatory diseases.
- In the past two decades, the overall mortality rates have consistently been more than twice as high in the population with diabetes compared to those without diabetes. This ratio between the two rates reflects the significance of diabetes on overall mortality.
- Men, both with and without diabetes, had consistently and significantly higher mortality rates than women, across all years.
- Mortality rates for both men and women have decreased over the years, but associated mortality rates ratios between men and women with and without diabetes have not changed systematically over time.

3.1.3 Age-group Specific Mortality Rates 1988/89 to 2005/06

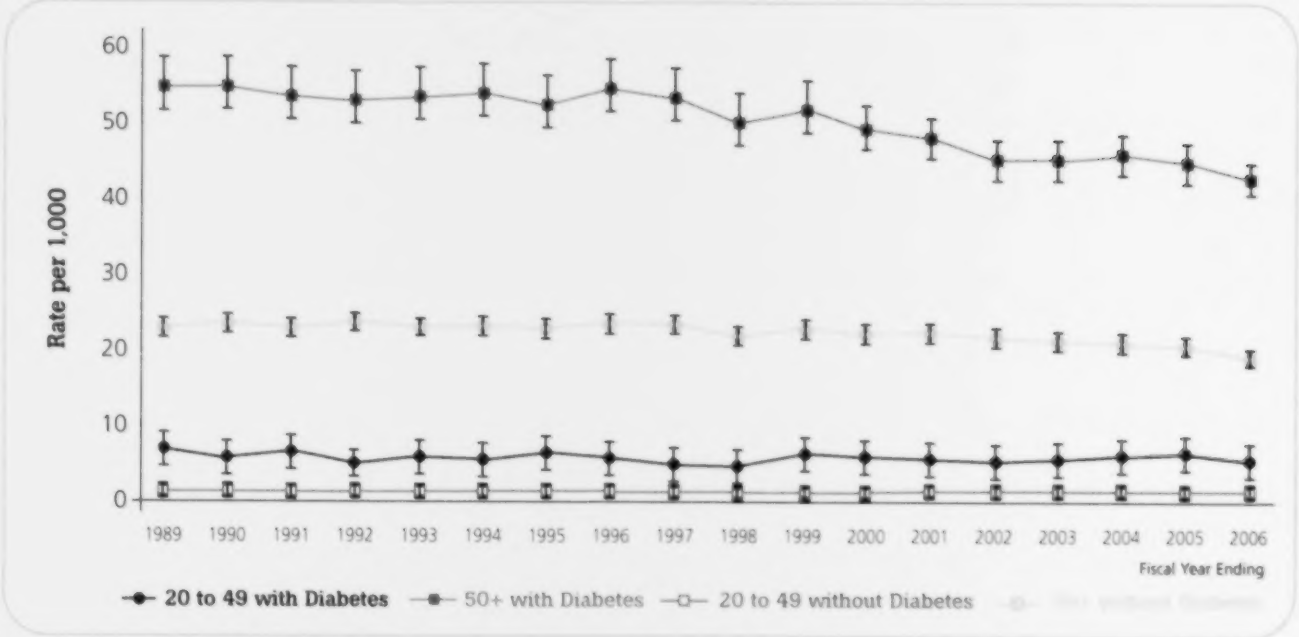


Figure 20: Manitoba Age-specific Mortality Rates 1988/89 to 2005/06

- Mortality rates increase with age.
- Mortality rates of 20-to-49-year-old Manitobans with diabetes have not changed substantially between 1988/89 and 2005/06. The risk of death for 20-to-49-year-olds with diabetes has been consistently about five times higher than for those Manitobans without diabetes.
- Mortality rates of Manitobans with diabetes 50 years of age and older were an average of about 54 per 1,000 for people with diabetes in between 1988/89 and 1996/97. After 1998, the mortality rate declined to a significantly lower average of 49 per 1,000 between 2001/02 and 2005/06. The start of this decline corresponds with the publication and adoption of revised clinical practice guidelines for diabetes in 1998.
- Mortality rates in the Manitoba population older than 50 years of age who did not have diabetes were also stable until about 1997. The rates then started a significant decline. The risk of death for those older than 50 years of age who has diabetes has been consistently about 2.3 times higher than for those Manitobans without diabetes.

3.1.4 Five-year Age-specific Mortality Rates 2002 to 2006

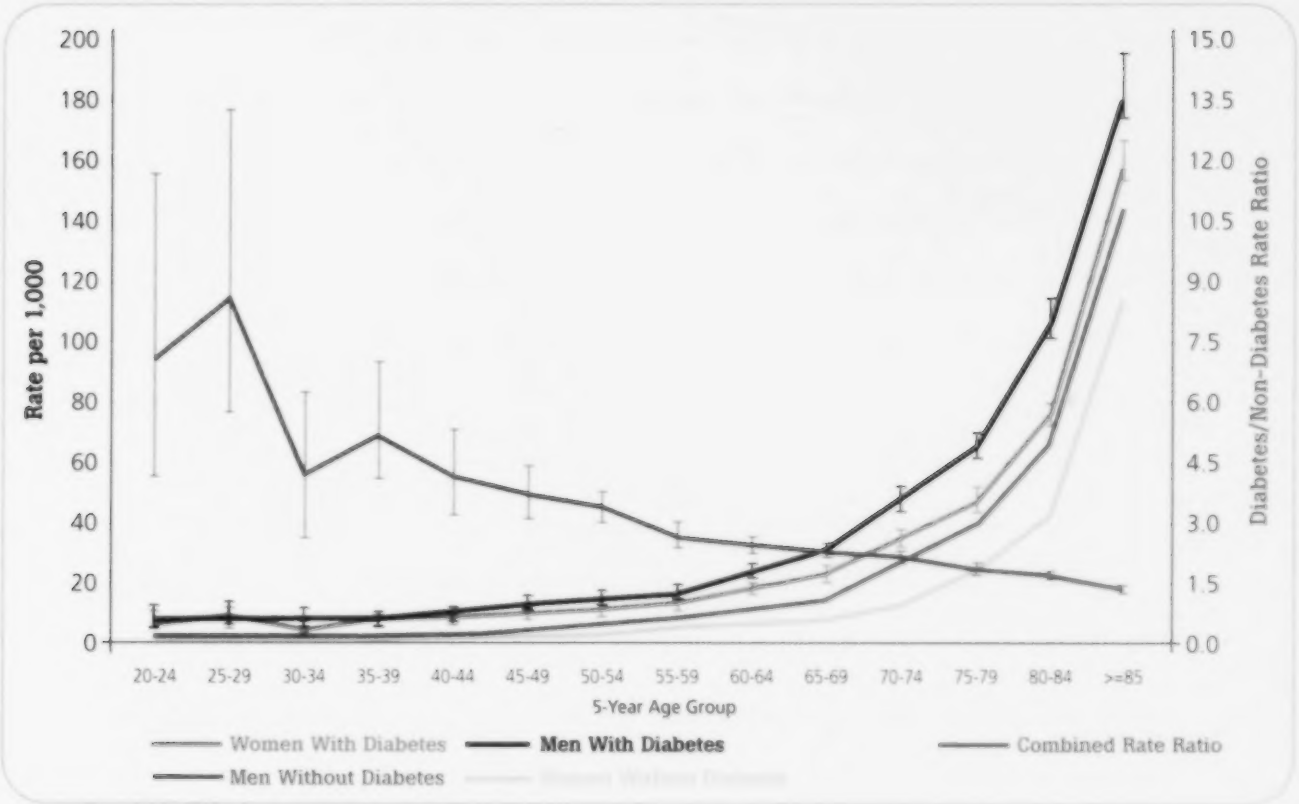


Figure 21: Manitoba Age and Sex-specific Mortality Rates 2001/02 to 2005/06

- Mortality rates for those who have diabetes are consistently and significantly higher at all ages than mortality rates for those who do not have diabetes.
- Both individuals with and without diabetes have higher mortality rates as they become older, with mortality rates starting to increase dramatically for 65-to-69-year-olds.
- Mortality rates are similar for younger men and women; however, male death rates become significantly higher past age 54 for those without diabetes, and past age 59 for those with diabetes.
- The mortality rate ratios demonstrate that younger people with diabetes have a much higher risk of dying, compared to older individuals, than those without diabetes in the same age groups. In fact, individuals with diabetes between the ages of 25 and 29 years were almost nine times more likely to die than 25-to-29-year-olds without diabetes. In the age groups 75 years and older, those with diabetes are almost twice as likely to die as those without diabetes, in the same age group.

3.1.5 Diabetes-related Life Expectancy

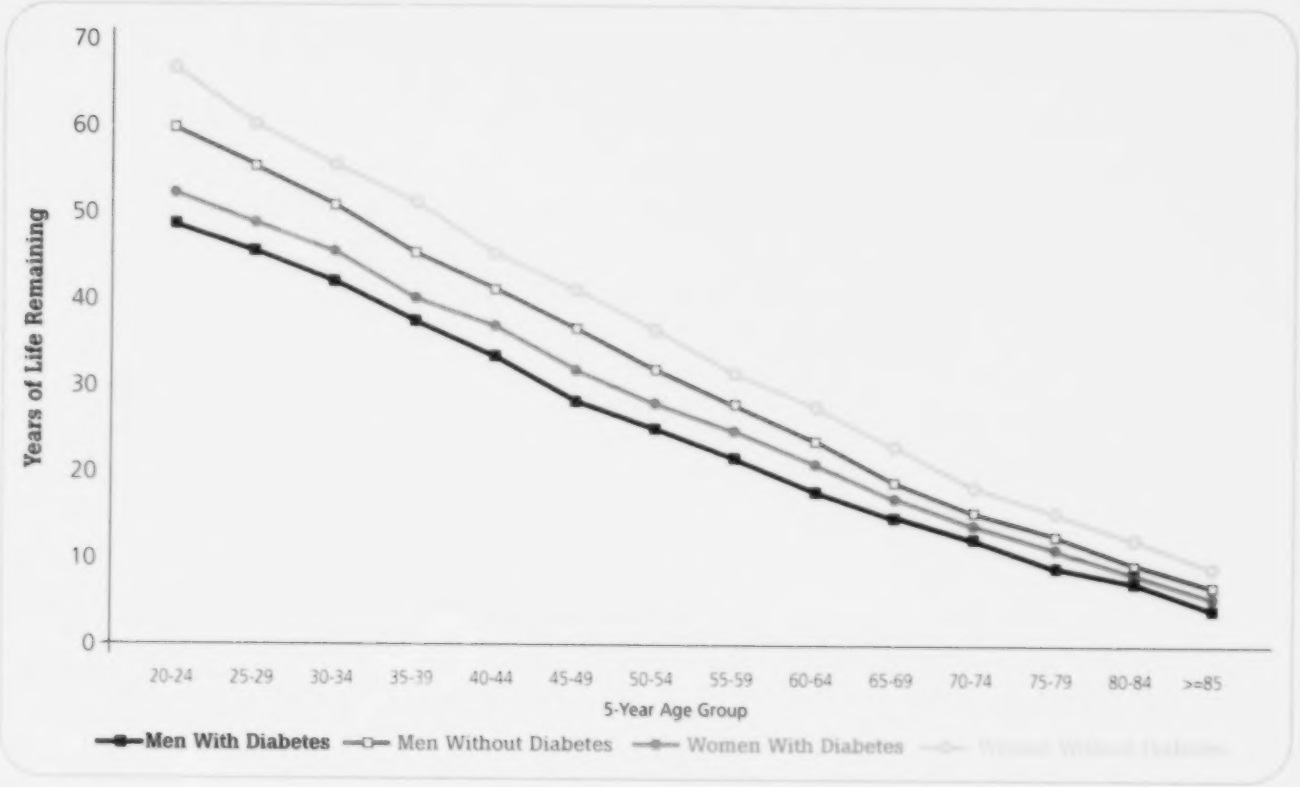


Figure 22: Years of Life Remaining 2001/02 to 2005/06

- **"Life expectancy"** represents the average number of age categories remaining until death, for individuals surviving to the beginning of a given age category. Life expectancy is calculated using an abridged period life table approach where the average cross-sectional mortality experience of a population measured over a short period of time (five years) is applied to the life span of a hypothetical population (Canada 1990). It is assumed that this hypothetical population is stationary and that the number of births is equal to the number of deaths. Using this technique, expectations of life may be computed for any age group. The period life tables were constructed using Chiang's method and NDSS age- and sex-specific mortality data for individuals with and without diabetes[6].
- Diabetes shortens projected life expectancy for all ages. For example, both men and women in the 20-to-29-year age groups, with diagnosed diabetes, would have more than a 10-year reduction in years of remaining life between 2001/02 and 2005/06. Men and women older than 75 years of age with diagnosed diabetes would have less than a four-year reduction in years of remaining life, compared to those without.

[6] *For detailed methods see: Manuel DG, Schultz SE. Adding Years to Life and Life to Years: Life and Health Expectancy in Ontario - Technical Supplement. Toronto, ON: Institute of Clinical Evaluation Sciences, 2001. (http://www.ices.on.ca/webpage.cfm?site_id=1&org_id=31&morg_id=0&gsec_id=0&item_id=1280)*

3.1.6 Diabetes Deaths in Regional Health Authorities 2002-2006

Regional Mortality Rates with Diabetes

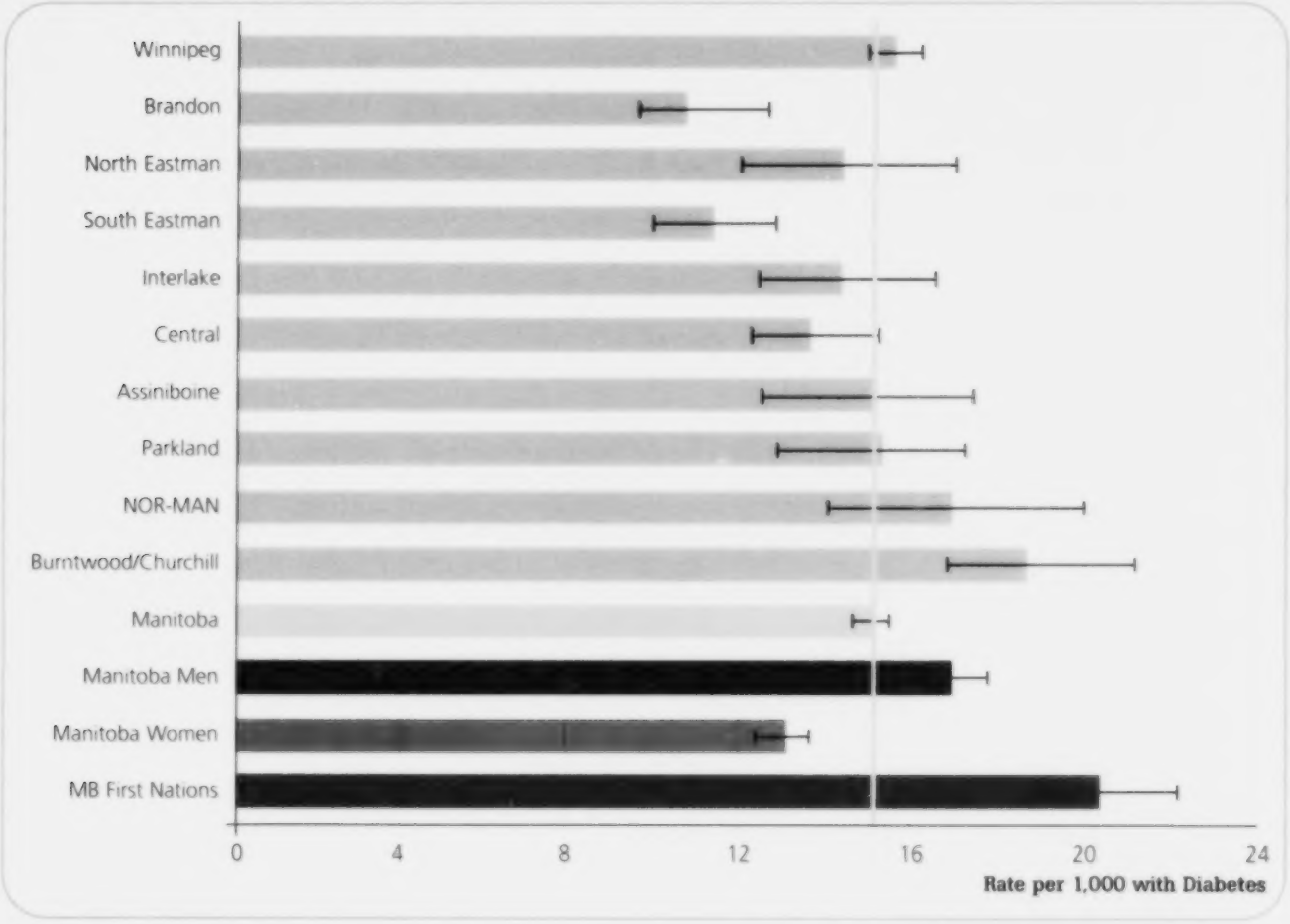


Figure 23: Age-adjusted Mortality Rates with Diabetes 2001/02 to 2005/06

- Average age-adjusted mortality rates in all regions were significantly higher for people with diabetes than for people without diabetes.
- Average age-adjusted mortality rates for people with diabetes were significantly higher than the Manitoba rate in Burntwood/Churchill region. They were significantly lower in Brandon and South Eastman regions.
- Average age-adjusted mortality rates for people without diabetes were significantly higher than the Manitoba rate in Burntwood/Churchill and NOR-MAN regions. They were significantly lower in South Eastman, Central and Assiniboine regions.
- Average age-adjusted mortality rates were significantly higher in First Nations people than those for Manitoba, for people with or without diabetes.

Regional Mortality Rate Ratios

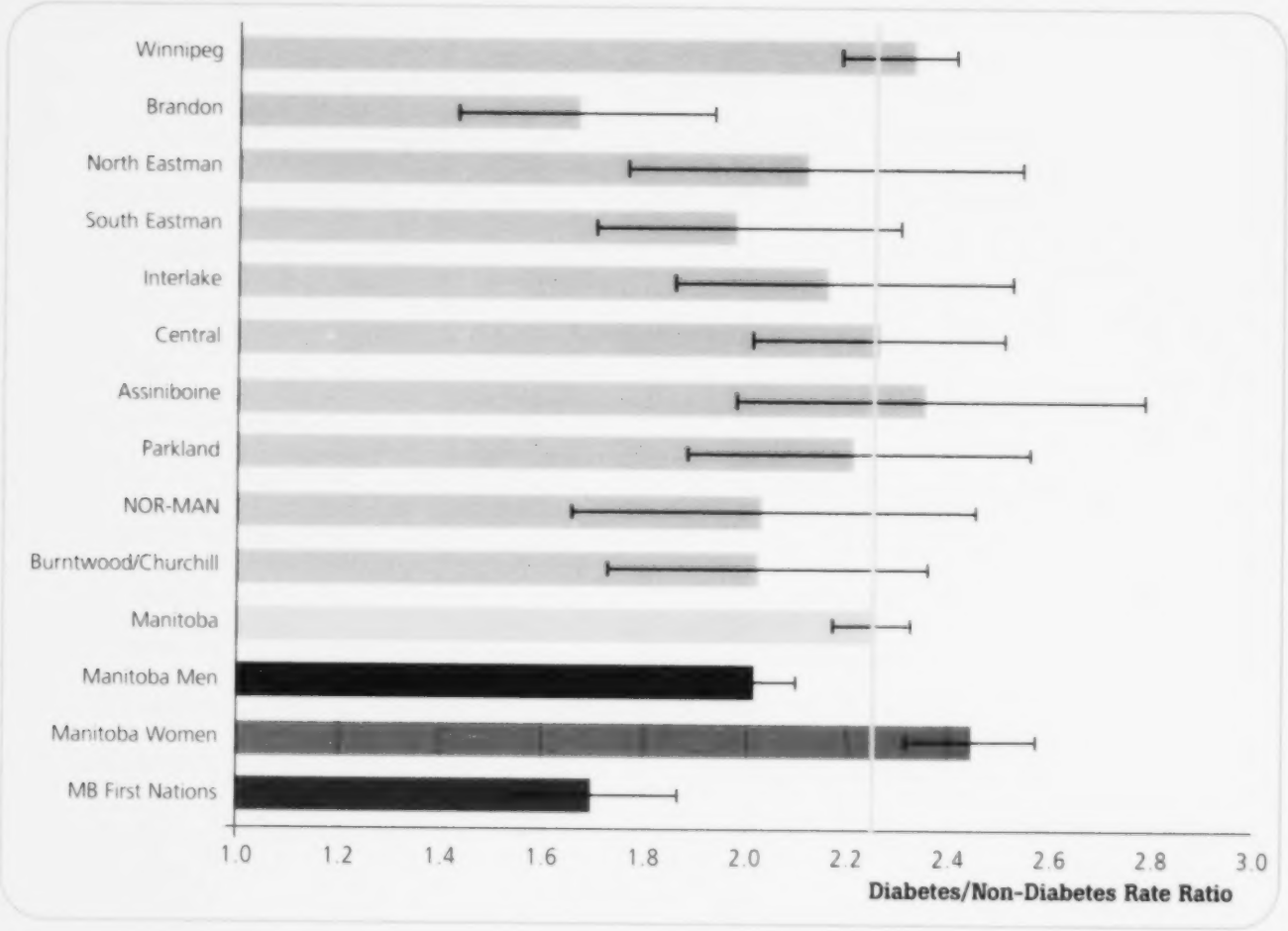


Figure 24: Mortality Rate Ratios 2001/02 to 2005/06

- Mortality rate ratios reflect the burden of diabetes on deaths in the population as a whole and can be interpreted as relative risk.
- Brandon had a significantly lower diabetes mortality rate ratio (1.65 ±0.24), than Manitoba (2.24 ±0.08) as a whole. This reflects the previously observed significantly lower age-adjusted mortality rates in those who had been diagnosed with diabetes.
- Mortality among people with diabetes, compared to those without, was significantly higher for women (mortality rate ratio 2.43 ±0.12) than for men (mortality rate ratio 2.01 ±0.09). However mortality rates for men, with and without diabetes, were higher than women's mortality rates.
- Mortality among people with diabetes compared to those without was significantly lower for First Nations people (mortality rate ratio 1.69 ±0.18) than for the whole Manitoba population (mortality rate ratio 2.24 ±0.08). However mortality rates for First Nations people, with and without diabetes, were significantly higher.

Regional Potential Years of Life Lost (PYLL)

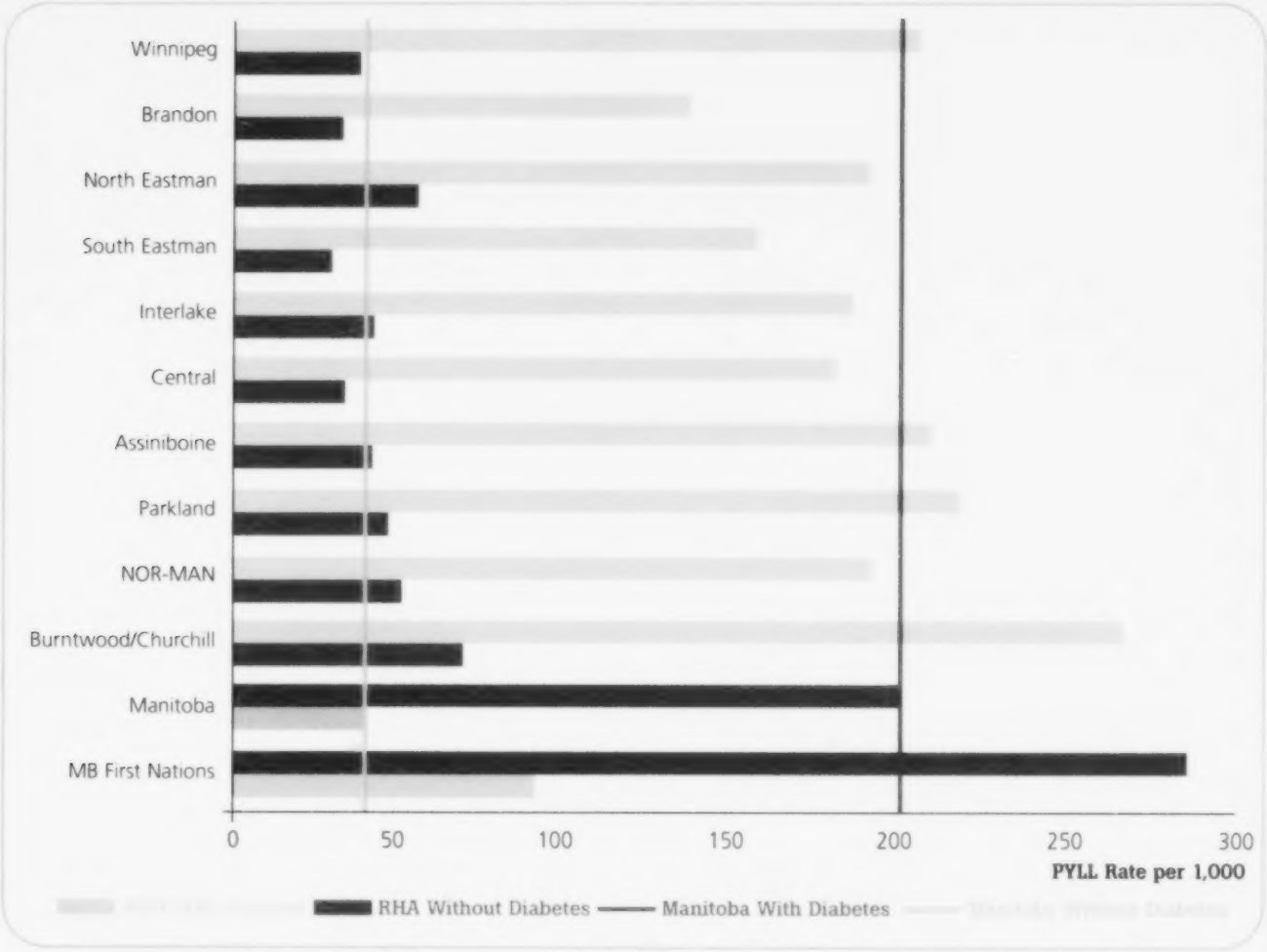


Figure 25: Potential Years of Life Lost (PYLL 1-75) 2001/02 to 2005/06

- **"Potential years of life lost" (PYLL)** is an indicator of premature mortality. It represents the number of years not lived by individuals between the ages of one and 75. This indicator gives more weight to deaths that occurred at younger ages than to those that occurred at older ages. The upper age limit of 75 is used to approximate the life expectancy of Canadians for both sexes combined. Deaths occurring in individuals age 75 years or older and deaths among infants younger than one-year-old are NOT included in the calculation.
- Average PYLL rates for people who have lived with diabetes range from a low of 138 years per 1,000 in Brandon region, to a high of 263 years per 1,000 in Burntwood/Churchill region, with 201 years per 1,000 in Manitoba.
- The increased relative risk of premature mortality associated with diabetes may be calculated as the ratio of PYLL rates between people with and without diabetes. These PYLL rate ratios suggest that the relative risk of premature death in the population who has lived with diabetes is about 3.6 (North Eastman) to 5.0 times (Central)

higher than in the population without diabetes.

- The PYLL rate in the Manitoba First Nations population is higher than in Manitoba for the population who has lived with diabetes (286 years per 1,000) and without diabetes (93 years per 1,000).

3.1.7 Key Results

- Deaths of people with diabetes in Manitoba accounted for about one-quarter (26%) of all Manitoba deaths in each year.
- In the past two decades, overall mortality rates have consistently been more than twice as high in people with diabetes, compared to those without diabetes.
- Mortality rate ratios demonstrate that younger people with diabetes have a much higher risk of dying, than older people when compared to those without diabetes in the same age groups.
- The risk of death among people with diabetes, compared to those without, was significantly higher for women than for men. However, age-adjusted mortality rates for men with diabetes were higher.
- The risk of death among people with diabetes, compared to those without, was significantly lower for First Nations people than for the whole Manitoba population.
- Diagnosed diabetes shortens projected life expectancy for all ages. For example, both men and women in the 20-to-29-year age groups with diagnosed diabetes would have more than a 10-year reduction in years of life remaining, compared to those without diabetes.

3.2 Lower Limb Amputation

3.2.1 Introduction

Complications of diabetes include nerve (diabetic peripheral neuropathy) and circulatory (atherosclerotic peripheral arterial disease) problems in the extremities, particularly in the legs and feet. Therefore, people with diabetes are much more likely to develop chronic and severe infections and ulcers in legs and feet than are people without diabetes.

Complex soft tissue and bone infection is usually very difficult to treat because revascularization is often not possible. In these cases, amputation is sometimes required to control infections known as gangrene.

For this report, lower limb amputation was identified as individuals with ICD-9-CM hospital procedure codes 8411-8417. This excludes lower limb amputation procedures associated with cancer, trauma and other specific diagnoses (ICD-9 170, 171, 213, 740-759, 800-900, 901-904, 940-950). Starting in 2004/05, hospital discharges were coded according to the ICD-10-CA system in Manitoba and diagnosis and procedure codes may not be fully compatible with the previous ICD-9 coding system. Therefore, we are reporting complications of diabetes up to the fiscal year 2003/04.

Similar to mortality rates and rate ratios, age-adjusted rates and rate ratios are calculated for selected complications of diabetes by substituting the counts of people discharged from hospitals for deaths.

Lower limb amputation in children and adolescents is relatively rare and, therefore, all lower limb amputation information is reported for the population aged 20 years and older.

3.2.2 Lower Limb Amputation Rates 1988/89 to 2003/04

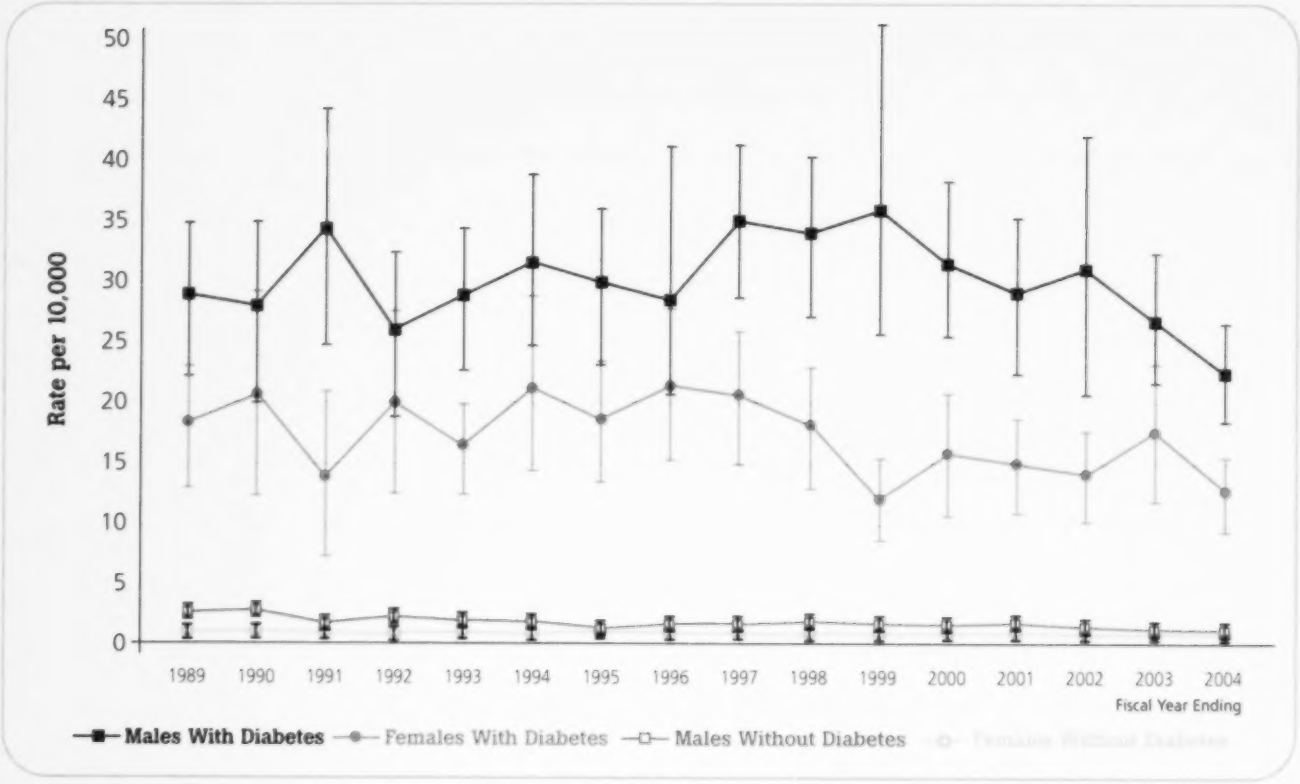


Figure 26: Manitoba Age-adjusted Lower Limb Amputation Rates (20 years and older) by Sex 1988/89 to 2003/04

- There were about 237 lower limb amputees annually, among people with diabetes in Manitoba, between 1999/2000 and 2003/04. They accounted for about three-quarters (77%) of all Manitoba lower limb amputees (310 per year) in the 20 years and older age group in each year. This procedure is much more common in people with diabetes than in people without.
- Between 1988/89 and 2003/04, people with diabetes were 16 to 41 times more likely to have a lower limb amputation than people without diabetes, after adjusting for age.
- Age-adjusted lower limb amputation hospitalization rates in people with diabetes were relatively stable. There was little variation at around 2.4 (±0.5) per 1,000 between 1988/89 and 1995/96. Since 1996/97, lower limb amputations have gradually declined by about 35%.
- Lower limb amputation was about twice as common in males, both with and without diabetes, than in females.

3.2.3 Lower Limb Amputation Five-year Age-specific Rates 2000 to 2004

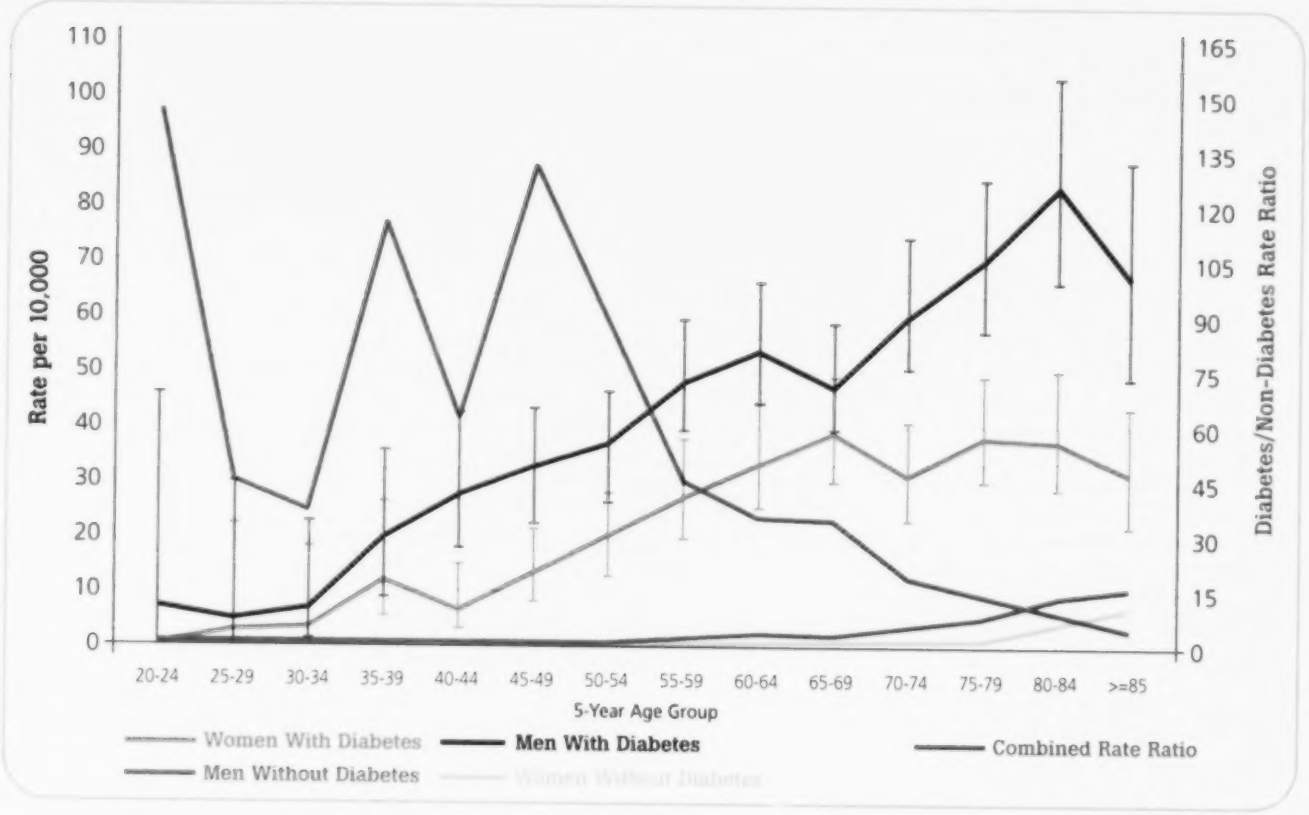


Figure 27: Manitoba Age and Sex-specific Lower Limb Amputation Rates 1999/2000 to 2003/04

- Lower limb amputation is very rare in young adults without diabetes but becomes more common in older adults with and without diabetes.
- The rate ratio (or relative risk) demonstrates that the risk of lower limb amputation is substantially greater for adults with diabetes compared to those without diabetes (RR = 28 ±4).
- Lower limb amputation rates are higher for men than for women. Male rates become significantly higher than female rates for Manitobans age 60 and older without diabetes, and 40 years and older with diabetes.
- While there are more older people with lower limb amputation, younger people with diabetes have a much higher risk of lower limb amputation than older people, when compared to those without diabetes in the same age group. In fact, for 20-to-44-year-olds, those with diabetes are about 90 times more likely to have a lower limb amputation than those without diabetes. For people 65 years and older, those with diabetes are still 12 times more likely to have a lower limb amputation than those without.

3.2.4 Lower Limb Amputation Rates in Regional Health Authorities, 2000 to 2004

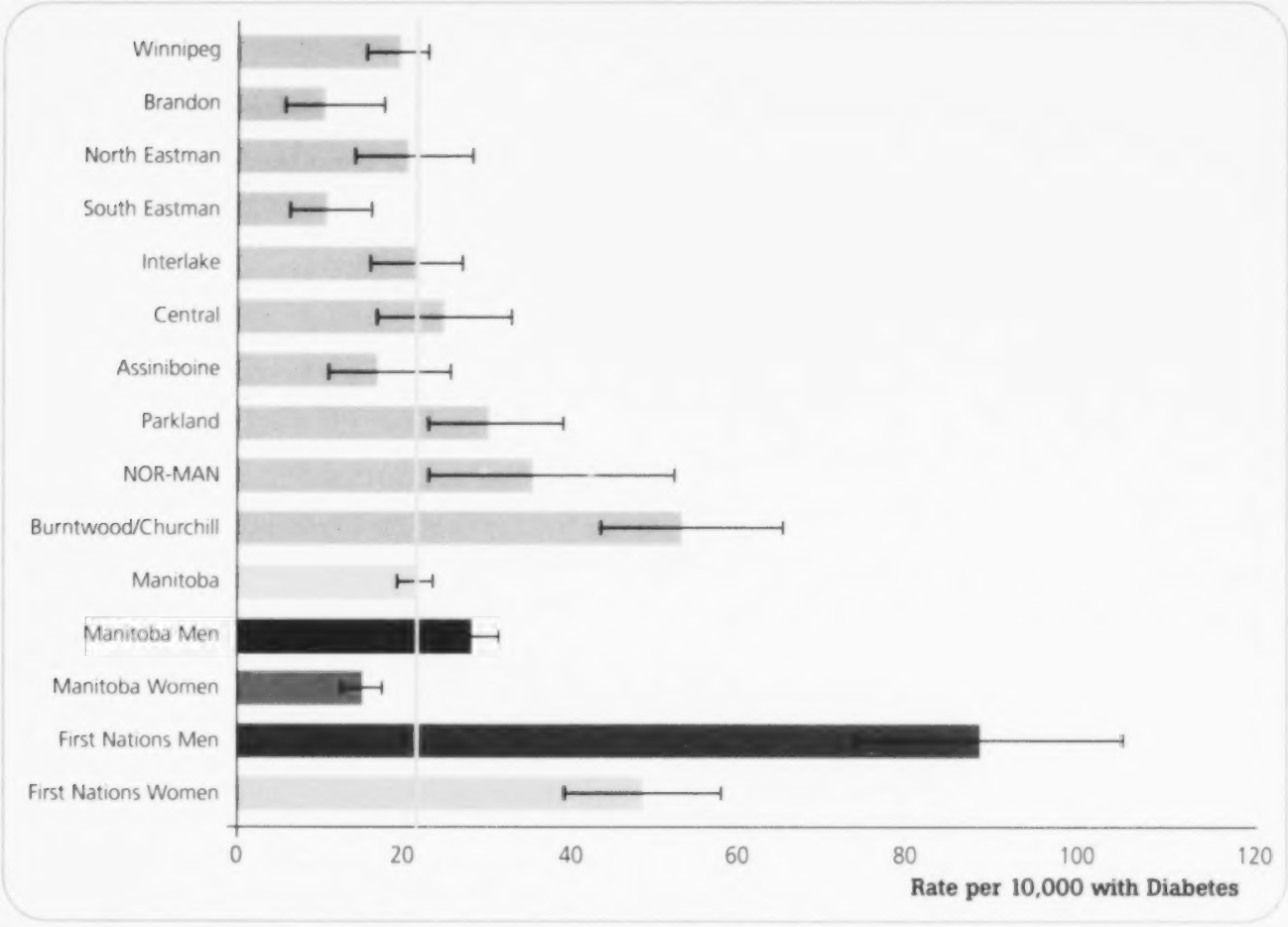


Figure 28: Age-adjusted Lower Limb Amputation Rates 1999/2000 to 2003/04

- Numbers of lower limb amputees among Manitobans without diabetes were too low to calculate stable age-adjusted rates or ratios for several regions. Therefore, crude and age-adjusted lower limb amputation rates for health regions are provided only for people with diabetes.
- Average age-adjusted lower limb amputation rates for people with diabetes were significantly higher than the Manitoba rate in Parkland, NOR-MAN and Burntwood/Churchill regions. They were significantly lower in Brandon and South Eastman regions.
- Average age-adjusted lower limb amputation rates in First Nations men and women with diabetes were more than three times higher, compared to all Manitoba men and women with diabetes.

3.2.5 Key Results

- Lower limb amputation among people with diabetes in Manitoba accounted for about three-quarters (77%) of all Manitobans with lower lower limb amputation.
- Age-adjusted lower limb amputation rates of people with diabetes were relatively stable between 1989 and 1996. Since 1997, lower limb amputation has gradually declined by about 35%.
- In Manitoba, people with diabetes were almost 30 times more likely to have a lower limb amputation than people without diabetes, after adjusting for age.
- Lower limb amputation was almost twice as common in males, both with and without diabetes, as in females.
- Lower limb amputation is very rare in young people without diabetes but becomes more common in older adults with and without diabetes.
- While there are more older people with lower limb amputation, younger people with diabetes have a much higher risk of lower limb amputation than older people, when compared to those without diabetes in the same age group.
- Age-adjusted lower limb amputation rates of First Nations men and women with diabetes were more than three times higher than for all Manitoba men and women with diabetes.

3.3 Chronic Kidney Disease

3.3.1 Introduction

One of the complications of diabetes is diabetic nephropathy, a progressive loss of kidney function characterized by high protein levels in urine. Diabetic nephropathy is one of the most common causes of chronic kidney disease (CKD). Many patients in the final stage of CKD require some form of chronic dialysis or a kidney transplant as a permanent life-sustaining therapy.

In NDSS, chronic kidney disease is identified as patients discharged from hospital with ICD-9-CM diagnoses 585 (chronic renal failure), or 586 (renal failure, unspecified). We report diabetes complications up to the 2003/04 fiscal year because, starting in 2004/05, hospital discharges were coded according to the ICD-10-CA system in Manitoba. Current diagnosis and procedure codes may not be fully compatible with the previous ICD-9 coding system. The limitation to CKD-related hospital visits excludes outpatient and community-physician treated CKD. Therefore, rates in this report are not suitable for use as population level CKD incidence rates.

Similar to mortality rates and rate ratios, age-adjusted rates and rate ratios are calculated for selected complications of diabetes by substituting the counts of people discharged from hospitals for deaths Diabetes-complication rate ratios reflect the increased relative risk of developing the condition in the population with diabetes, compared to the population without diabetes.

Chronic kidney disease in children and adolescents is relatively rare. As a result this report focuses on diabetes complications for the population aged 20 years and older.

3.3.2 Chronic Kidney Disease Rates 1988/89 to 2003/04

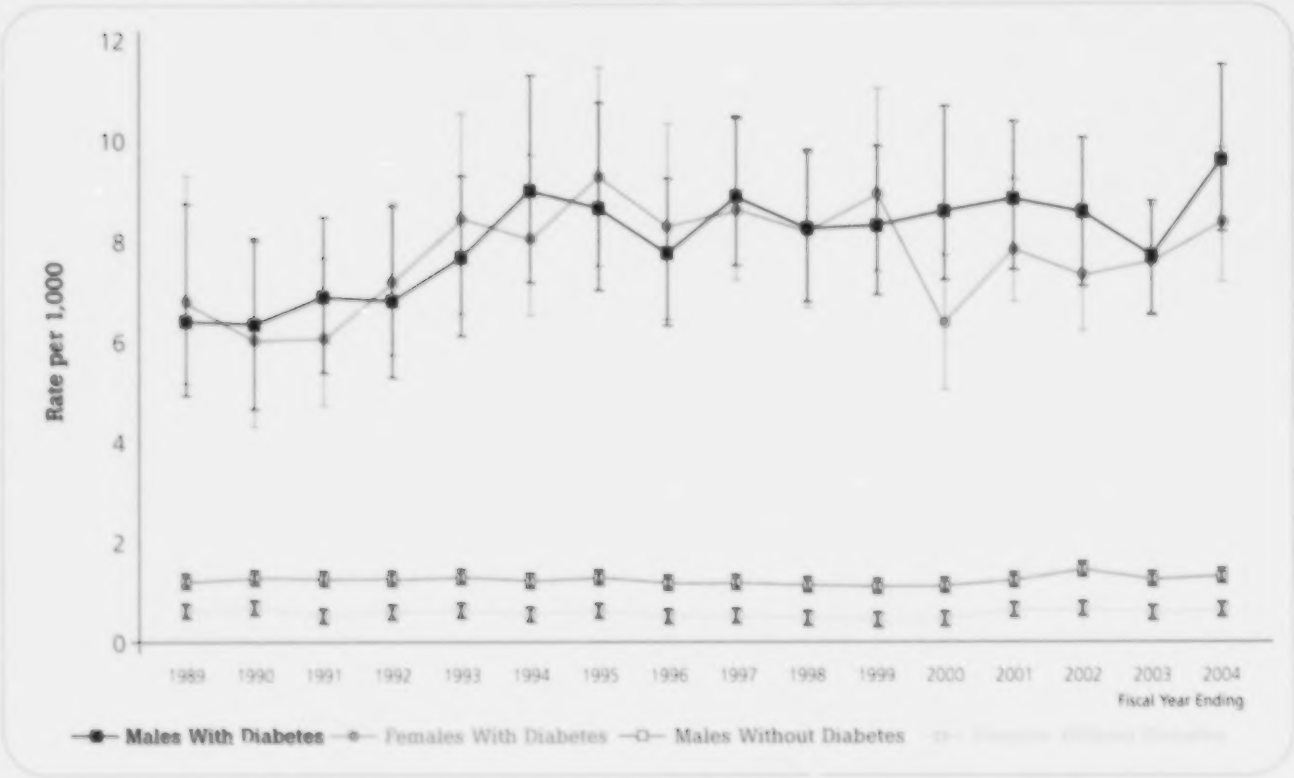


Figure 29: Manitoba Age-adjusted Chronic Kidney Disease Rates (20 Years and Older) by Sex 1988/89 to 2003/04

- There were an average of 877 people with diabetes per year in Manitoba in hospital with CKD between 1999/2000 and 2003/04. They accounted for about 50% of all Manitoba patients with CKD (20 years old and older) (1,743 per year) in each year, compared to one-third (34%) diabetes-related CKD patients between 1988/89 and 1992/93.
- CKD rates among people with diabetes were relatively constant. There was little variation around eight per 1,000. Males were slightly, but not significantly, higher than females in most years.
- CKD hospital diagnosis was consistently about twice as common in males without diabetes (1.2 per 1,000) than in females without diabetes (0.6 per 1,000).
- Between 1993/1994 and 2003/04, people with diabetes were about nine to 11 times more likely to have a chronic kidney disease hospital diagnosis than people without diabetes.

3.3.3 Chronic Kidney Disease Five-year Age-specific Rates 2000 to 2004

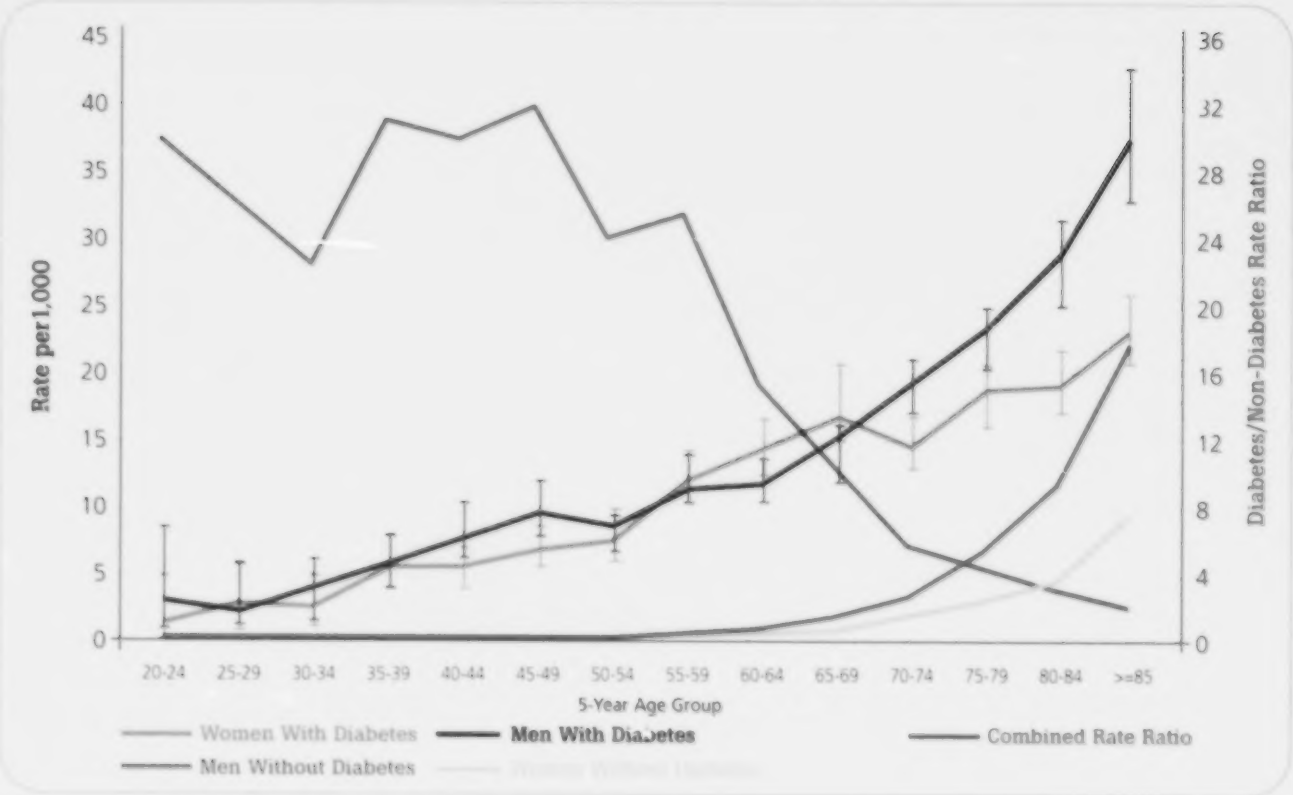


Figure 30: Manitoba Age and Sex-specific Chronic Kidney Disease Rates 1999/2000 to 2003/04

- CKD hospitalization rates for those who have diabetes are consistently and significantly higher at all ages than CKD rates for those who do not have diabetes.
- Both individuals with and without diabetes have higher CKD hospitalization rates as they become older. Rates start to increase dramatically after the 60-to-64-year-old age group for those without diabetes.
- CKD rates are similar for younger men and women; however, male rates become significantly higher past age 65 years for those without diabetes and past 70 years for those with diabetes.
- While there are more older people with CKD hospital diagnoses, younger people with diabetes have a much higher risk of CKD hospitalization than older people, when compared to those without diabetes in the same age groups. In fact, in the youngest age group of 20-year-olds, those with diabetes are about 30 times more likely to have a chronic kidney disease diagnosis than those without diabetes. In the age groups 75 years and older, those with diabetes are less than five times more likely to have a chronic kidney disease diagnosis than those without diabetes.

3.3.4 Chronic Kidney Disease in Regional Health Authorities 2000 to 2004

Regional Chronic Kidney Disease Rates

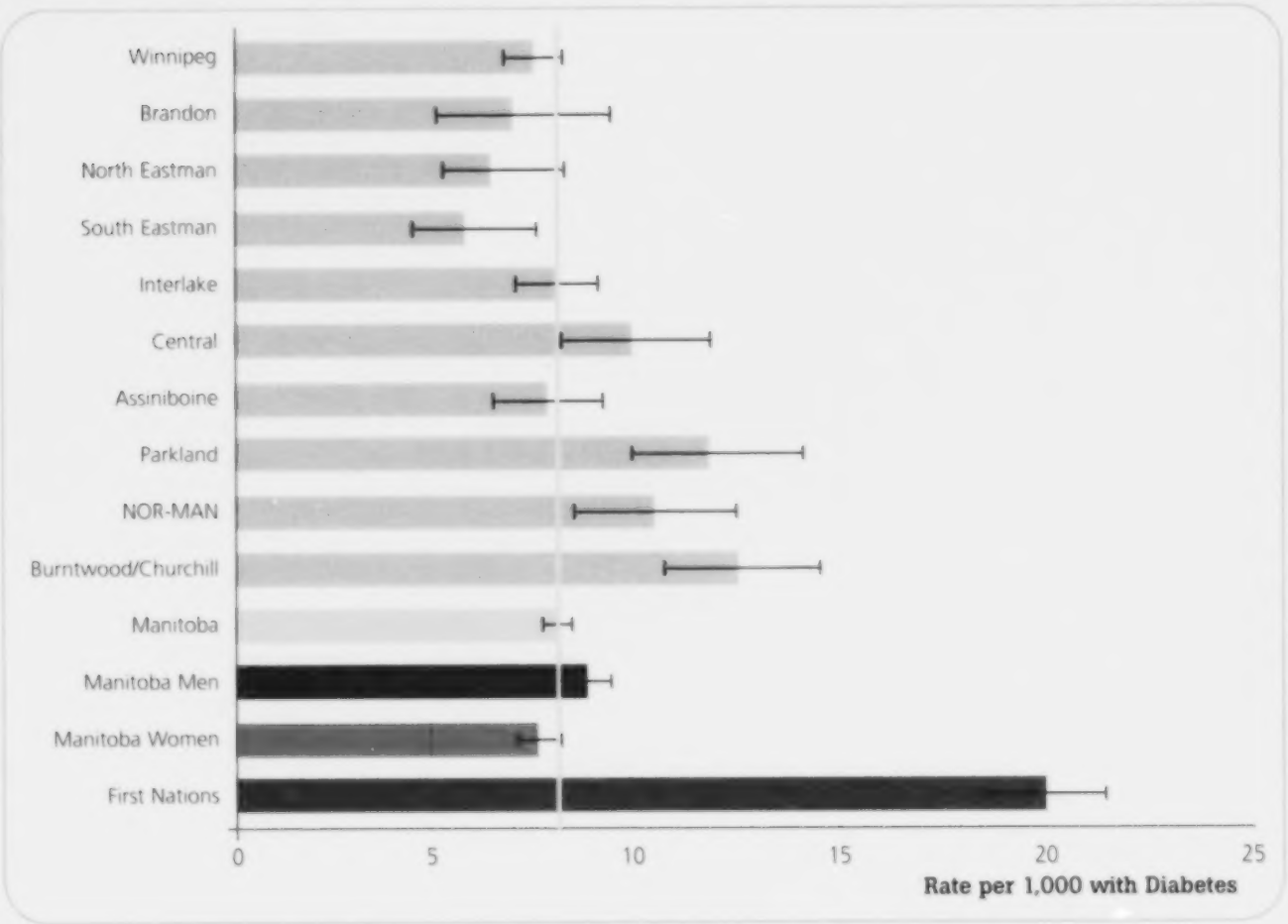


Figure 31: Age-adjusted Chronic Kidney Disease Rates with Diabetes 1999/2000 to 2003/04

- Average age-adjusted CKD rates for those with diabetes were significantly higher than the Manitoba rate in Parkland, NOR-MAN and Burntwood/Churchill regions. They were significantly lower in South Eastman region.
- Average age-adjusted CKD rates in First Nations people with diabetes were more than twice as high as Manitoba rates.

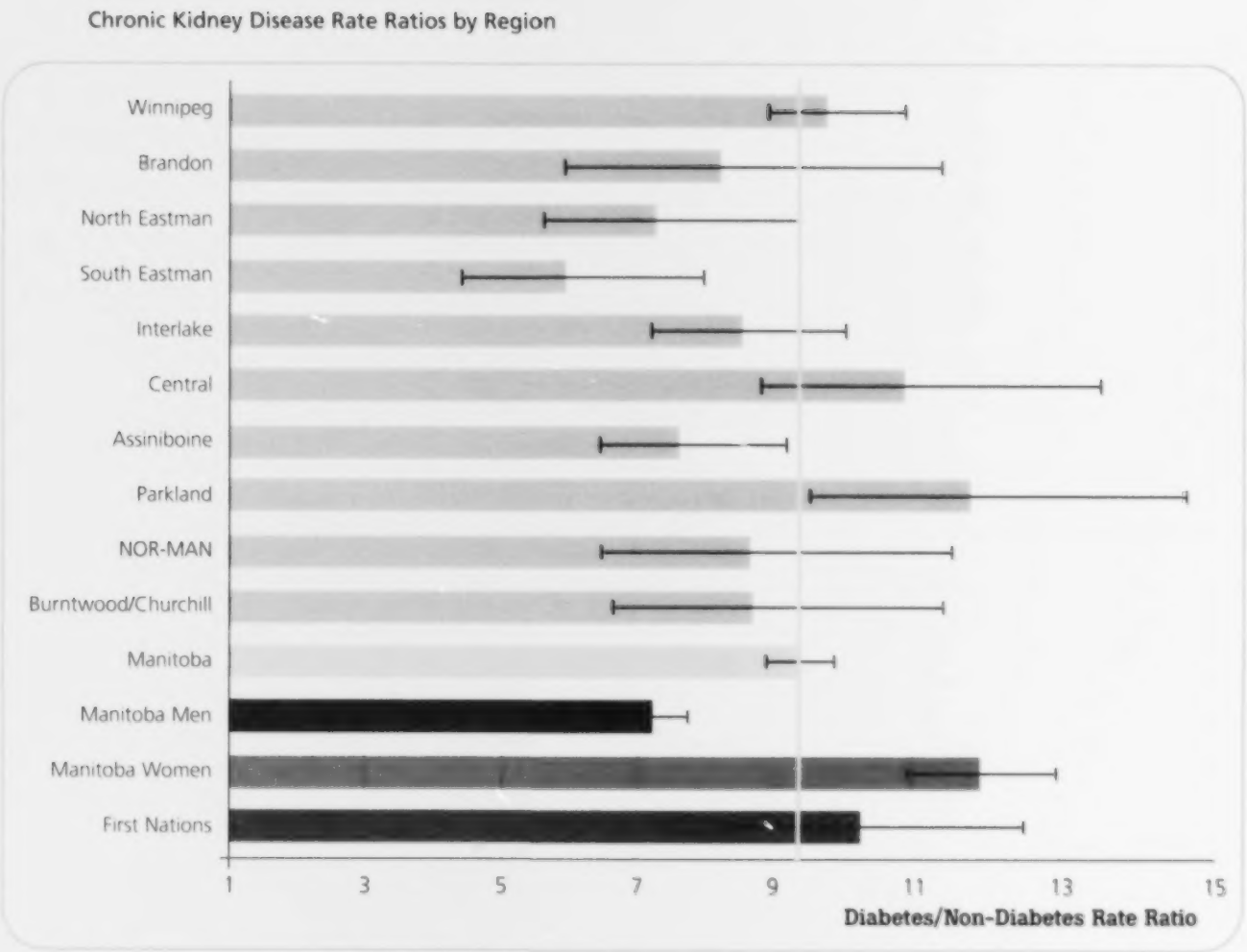


Figure 32: Chronic Kidney Disease Rate Ratios 1999/2000 to 2003/04

- Diabetes/non-diabetes CKD rate ratios reflect the burden of diabetes on chronic kidney disease hospitalizations in the population as a whole. They can be interpreted as relative risk ratios.
- South Eastman region had a significantly lower diabetes CKD rate ratio than Manitoba as a whole. Parkland region had a considerably higher diabetes chronic kidney disease rate ratio than Manitoba.
- CKD hospitalization among people with diabetes, compared to those without, was significantly higher for women than for men.

3.3.5 Key Results

- People with diabetes in Manitoba accounted for about half (50%) of all Manitoba hospital patients with a CKD diagnosis in each year between 2000 and 2004, compared to one-third (34%) diabetes-related between 1989 and 1993.
- In Manitoba, people with diabetes were almost 10 times more likely to have a chronic kidney disease diagnosis than people without diabetes.
- Men with diabetes had a higher age-adjusted chronic kidney disease rates than women with diabetes.
- The risk of being diagnosed with CKD among people with diabetes, compared to those without, was significantly higher for women than for men.
- CKD is very rare in young people without diabetes but becomes more common in older adults with and without diabetes.
- While there are more older people with CKD hospital diagnoses, younger people with diabetes have a much higher risk of CKD hospitalization than older people, when compared to those without diabetes in the same age groups.
- Average age-adjusted CKD rates in First Nations people with diabetes were more than twice as high as Manitoba rates.

3.4 Circulatory System Diseases

3.4.1 Introduction

One of the main complications of diabetes is large blood vessel (macrovascular) damage that contributes to a decrease in blood circulation. Circulatory system complications include elevated blood pressure (hypertension), ischemic heart disease, including acute myocardial infarction (AMI), cerebrovascular disease, including stroke, and heart failure.

For this report, macrovascular complications are represented by circulatory system diseases (CSD) as identified by patients discharged from hospital with ICD-9-CM diagnoses 390 through 448. Specific diseases within the circulatory systems group that are monitored by the NDSS include hypertensive disease (ICD-9 401-405), ischaemic heart disease (IHD) (ICD-9 410-414), acute myocardial infarction (AMI) (ICD-9 410), heart failure (ICD-9 428), and cerebrovascular diseases (stroke) (ICD-9 430-438).

We report diabetes complications up to the 2003/04 fiscal year; because, starting in 2004/05, hospital discharges were coded according to the ICD-10-CA system in Manitoba. ICD-10 diagnosis and procedure codes may not be fully compatible with the previous ICD-9 coding system.

Similar to mortality rates and rate ratios, age-adjusted rates and rate ratios are calculated for selected complications of diabetes by substituting the counts of people discharged from hospitals for deaths. Diabetes complication rate ratios reflect the increased relative risk of developing the condition, in the population with diabetes, compared to the population without diabetes.

Circulatory system diseases in children and adolescents are relatively rare and this report focuses on diabetes complications for the 20 years old and older.

3.4.2 Circulatory System Diseases Rates 1988/89 to 2003/04

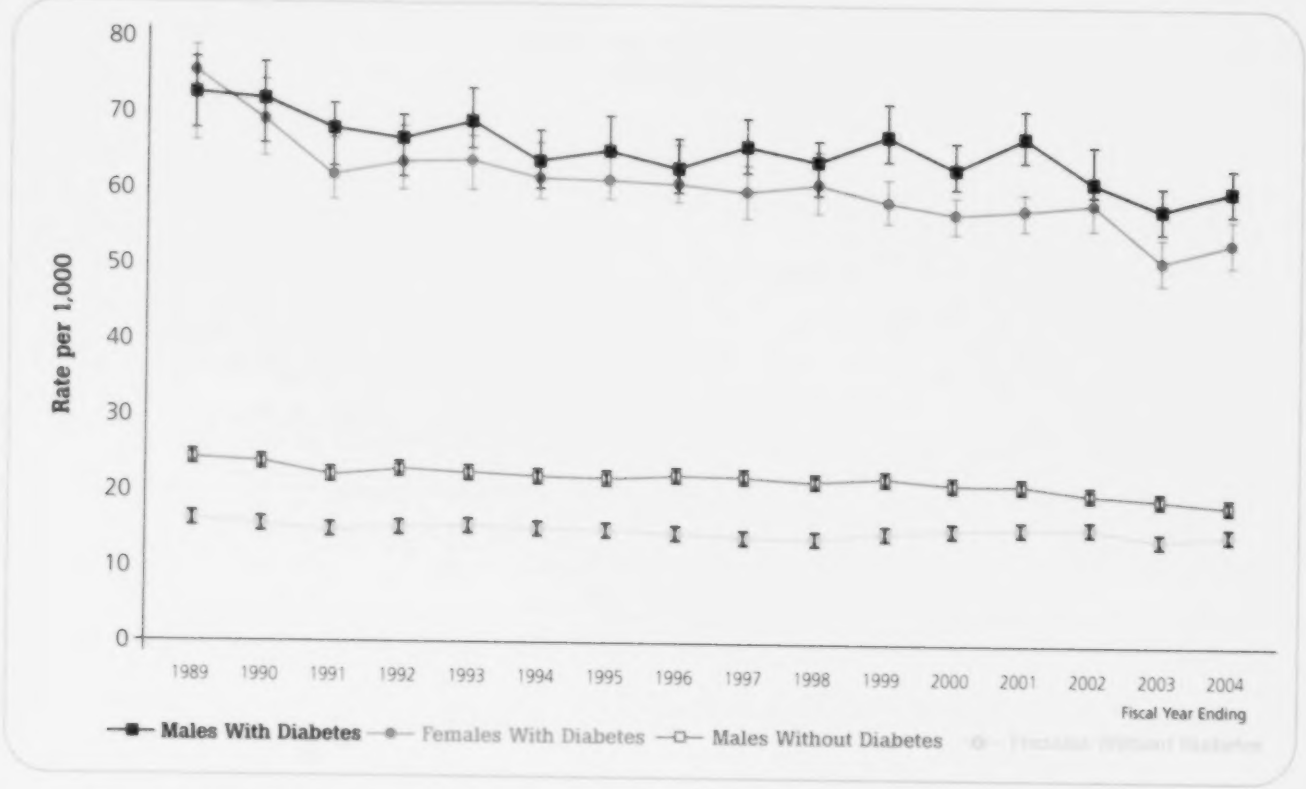


Figure 33: Manitoba Age-adjusted Circulatory System Diseases Rates (20 years and older) by Sex 1988/89 to 2003/04

- There were 7,453 people ages 20 years and older with diabetes in Manitoba in hospital with CSD between 1999/2000 and 2003/04. They accounted for almost one-third (31%) of all Manitoba patients with CSD (23,875 per year) in each year, compared to less than one quarter diabetes related (23%) CSD patients between 1988/89 and 1992/93.
- CSD rates among people with diabetes have gradually and significantly decreased over the years, from an average of about 68 per 1,000 diabetes cases between 1988/89 and 1992/93; to 58 per 1,000 diabetes cases between 2000/01 and 2004/05. The rate of decrease was lower for men than for women.
- CSD diagnosis was about 1.4 times as common in males without diabetes (22 per 1,000) than in females without diabetes (15 per 1,000).
- Between 1988/89 and 2003/04, people with diabetes were about 3.5 times more likely to have a CSD hospital diagnosis than people without diabetes.

3.4.3 Circulatory System Diseases Five-year Age-specific Rates 2000-2004

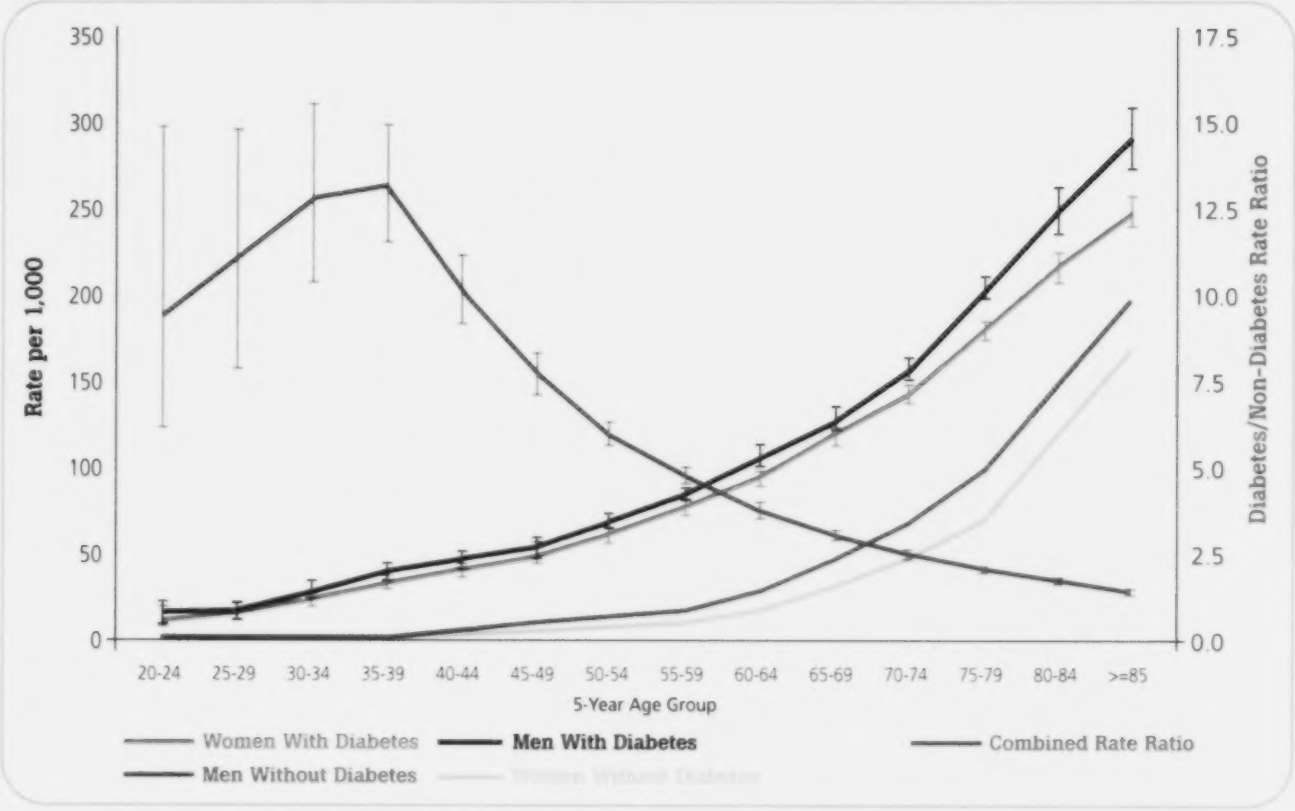


Figure 34: Manitoba Age and Sex-specific Circulatory System Diseases Rates 1999/2000 to 2003/04

- CSD rates for those who have diabetes are consistently and significantly higher at all ages than CSD rates for those who do not have diabetes.
- CSD is very rare in young adults without diabetes. Rates increase dramatically after the 55-to-59-year-old age group for those without diabetes. In the population with diabetes, CSD rates increase more gradually for all ages.
- CSD rates are similar for younger men and women. Male rates become significantly higher past age 54 years, for those without diabetes, and past age 64 years, for those with diabetes.
- While there are more older people with CSD hospital diagnoses, younger people with diabetes have a much higher risk of CSD hospitalization than older people, when compared to those without diabetes in the same age groups. In fact, in the age group of 35-to-39-year-olds, those with diabetes are about 13 times more likely to have a circulatory system diseases hospitalization than those without diabetes. In the age groups 75 years and older, those with diabetes are less than two times more likely to have a circulatory system disease hospitalization than those without diabetes.

3.4.4 Circulatory System Specific Diseases Rate Ratios 2000 to 2004

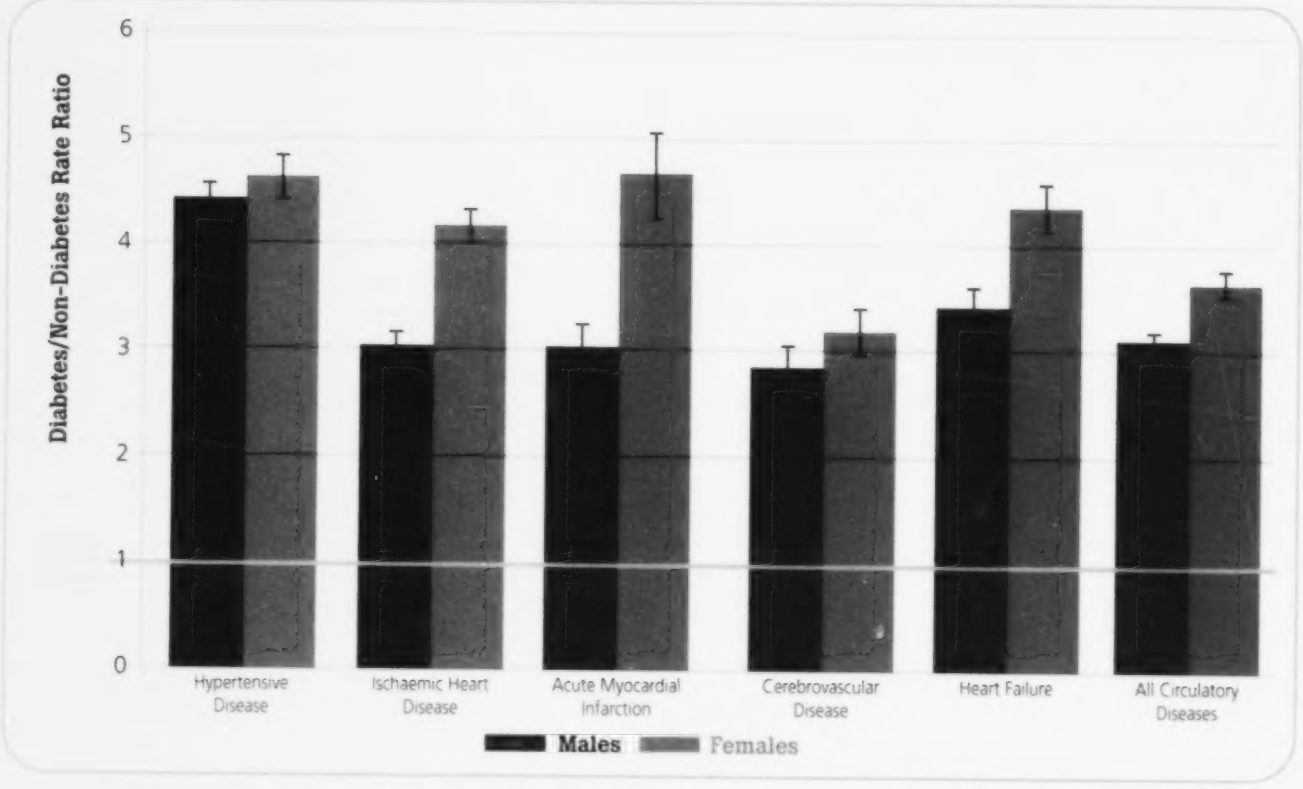


Figure 35: Circulatory System Specific Diseases Rate Ratios, Manitoba 1999/2000 to 2003/04

- The relative risk of having one of the specific circulatory system diseases ranges from about three times as likely for stroke, to 4.5 times as likely for hypertension, for people with diabetes, compared to those without.
- Rate ratios for specific circulatory system disease groups are elevated for female Manitobans compared to male Manitobans. There is a substantial and significant elevated relative risk for women with diabetes to experience ischaemic heart disease, acute myocardial infarction (heart attack) or heart failure.
- Rate ratios for hypertension and heart failure are elevated, compared to all circulatory system diseases, but they are significantly lower for cerebrovascular disease (stroke).

3.4.5 Circulatory System Diseases in Regional Health Authorities 2000 to 2004

Regional Circulatory System Diseases Rates

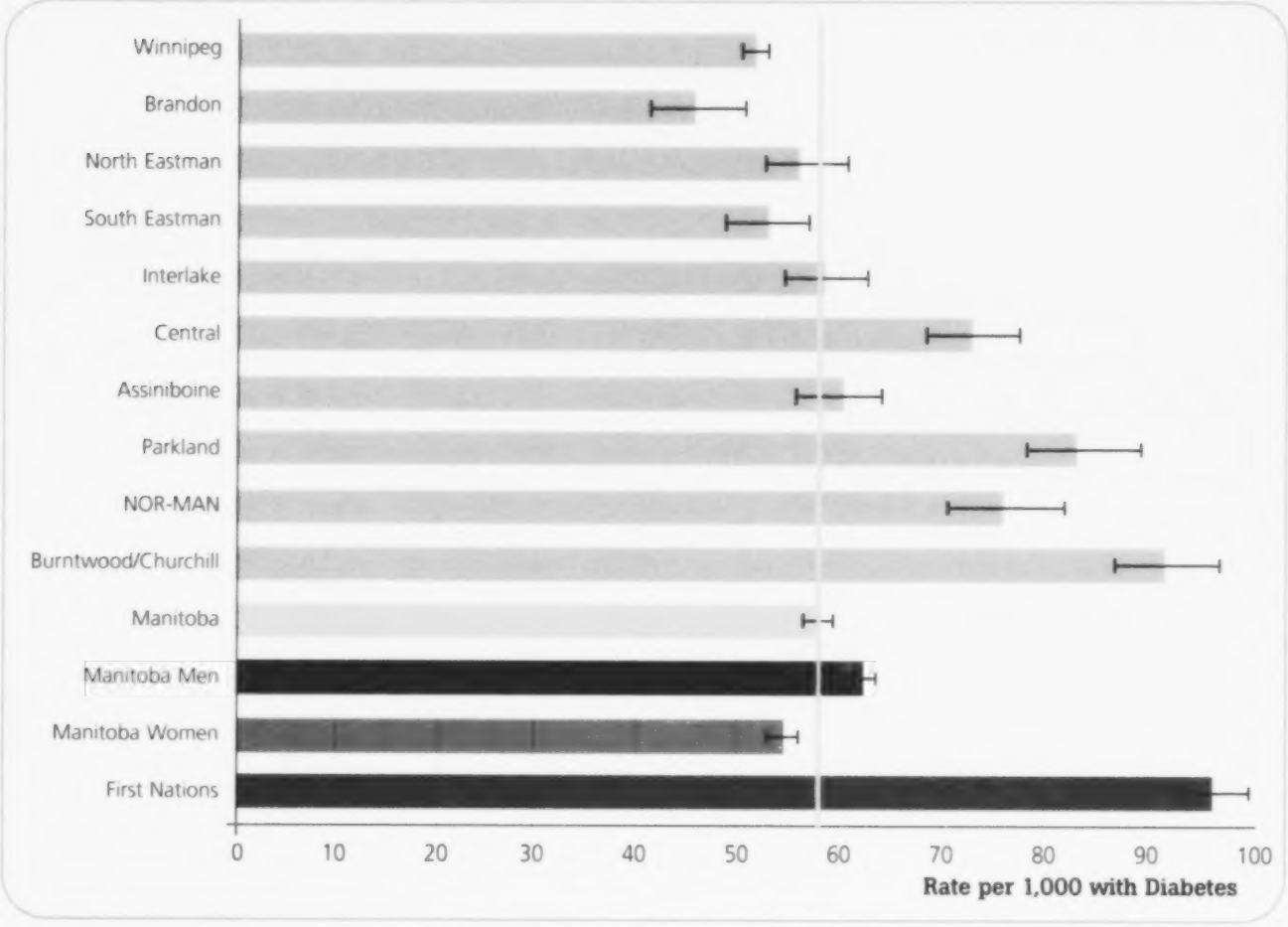


Figure 36: Age-adjusted Circulatory System Diseases Rates with Diabetes 1999/2000 to 2003/04

- Average age-adjusted CSD rates for people with diabetes were significantly lower than the Manitoba rate in Winnipeg, Brandon and South Eastman regions.
- Average age-adjusted CSD rates for people with diabetes were significantly higher than the Manitoba rate in Central, Parkland, NOR-MAN and Burntwood/Churchill regions.
- Average age-adjusted CSD rates in First Nations people with diabetes were more than 60% higher than in the overall Manitoba population with diabetes.

Regional Circulatory System Diseases Rate Ratios

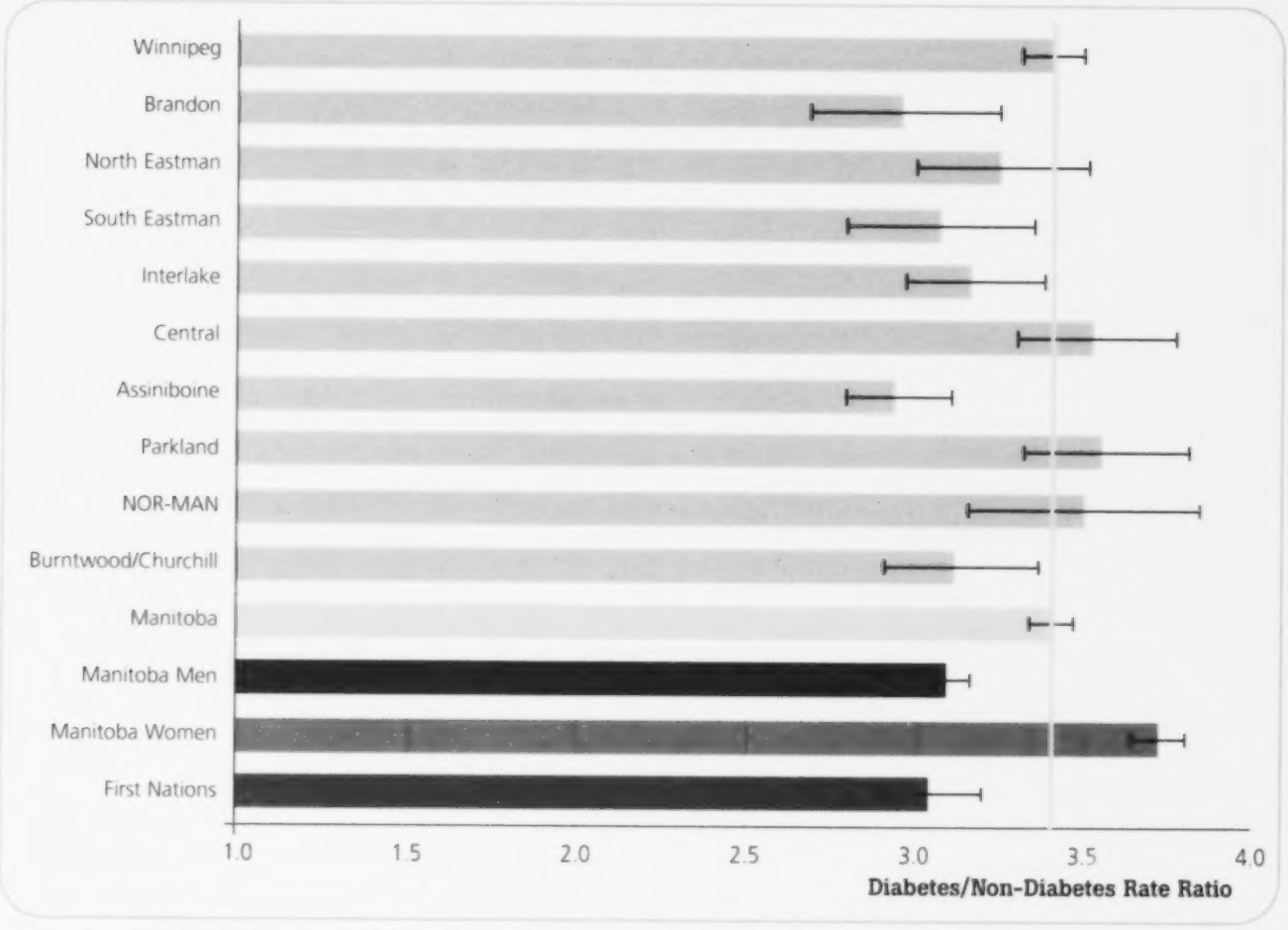


Figure 37: Circulatory System Diseases Rate Ratios 1999/2000 to 2003/04

- Diabetes/non-diabetes CSD rate ratios reflect the burden of diabetes on circulatory system diseases hospitalizations in the population as a whole and can be interpreted as relative risk ratios.
- Brandon, South Eastman and Assiniboine RHAs had significantly lower diabetes CSD rate ratios than Manitoba as a whole. For Brandon and South Eastman regions, these differences may reflect significantly lower age-adjusted CSD rates in people with diabetes.
- While CSD hospitalization risk among people with diabetes, compared to those without, was significantly higher for women (rate ratio 3.7) than for men (rate ratio 3.1), the hospitalization rates for men with diabetes were higher. For women, this risk has substantially declined from a rate ratio of 4.2 between 1988/89 and 1992/93, while the CSD rate ratio for men has remained stable.

- CSD hospitalization risk among people with diabetes, compared to those without, was slightly, but significantly, lower for First Nations people than for the whole Manitoba population. Average age-adjusted CSD rates in First Nations people with diabetes were much higher than in the overall Manitoba population with diabetes. This may suggest a slightly elevated CSD hospitalization risk in First Nations people without diabetes.

3.4.6 Key Results

- People with diabetes in Manitoba accounted for almost one-third of all Manitobans diagnosed with CSD in each year between 2000 and 2004, compared to less than one-quarter between 1989 and 1993.
- In Manitoba, people with diabetes were almost 3.5 times more likely to have a circulatory system diseases hospital diagnosis than people without diabetes.
- CSD rates among people with diabetes have gradually and significantly decreased over the years. They have gone from an average of about 68 per 1,000 diabetes cases between 1989 and 1993, to 58 per 1,000 diabetes cases between 2000 and 2004. The rate of decrease was lower for men than for women.
- CSD risk among people with diabetes, compared to those without, was significantly higher for women than for men. Age-adjusted circulatory system diseases rates for men with diabetes were higher. This may suggest that the commonly observed female protection against heart disease is reduced by diabetes.
- While there are more older people with CSD hospital diagnosis, younger people with diabetes have a much higher risk of CSD hospitalization than older people, when compared to those without diabetes in the same age groups.
- Average CSD rates in First Nations people with diabetes were more than 60% higher than in the overall Manitoba population with diabetes. This may suggest a slightly elevated CSD hospitalization risk in First Nations people without diabetes. However, CSD hospitalization risk among people with diabetes, compared to those without, was slightly, but significantly lower for First Nations people than for the whole Manitoba population.

3.5 Hospital Lengths of Stay

3.5.1 Definition

One measure of health system use is the length of stay in acute care hospitals, measured as days of hospitalization. NDSS analyses are based on **ALL** causes of hospital separation and not just separations due to diabetes. Information on hospital separations associated with specific conditions related to diabetes is provided in previous sections.

In NDSS, days of hospitalization are calculated using the difference between the date of discharge and the date of admission, they therefore, exclude any same-day stays. Similar to mortality rates and rate ratios, age-adjusted rates and rate ratios are calculated for days of hospitalization by substituting the number of days stayed in hospitals for deaths. Days-of-hospitalization rate ratios reflect the increased length of stay in hospitals in the population who have diabetes, compared to the population without diabetes.

$$\text{Days-of-hospitalization Rate (with diabetes)} = \frac{\text{Total number of days stayed in hospital by people with diabetes during the current fiscal year}}{\text{Total number of people with diabetes during the current fiscal year}}$$

$$\text{Days-of-hospitalization Rate (without diabetes)} = \frac{\text{Total number of days stayed in hospital by people without diabetes during the current fiscal year}}{\text{Total number of people without diabetes during the current fiscal year}}$$

$$\text{Days-of-hospitalization Rate Ratio} = \frac{\text{Days-of-hospitalization Rate among people with diabetes}}{\text{Days-of-hospitalization Rate among people without diabetes}}$$

3.5.2 Days-of-hospitalization Rates 1988/89 to 2005/06

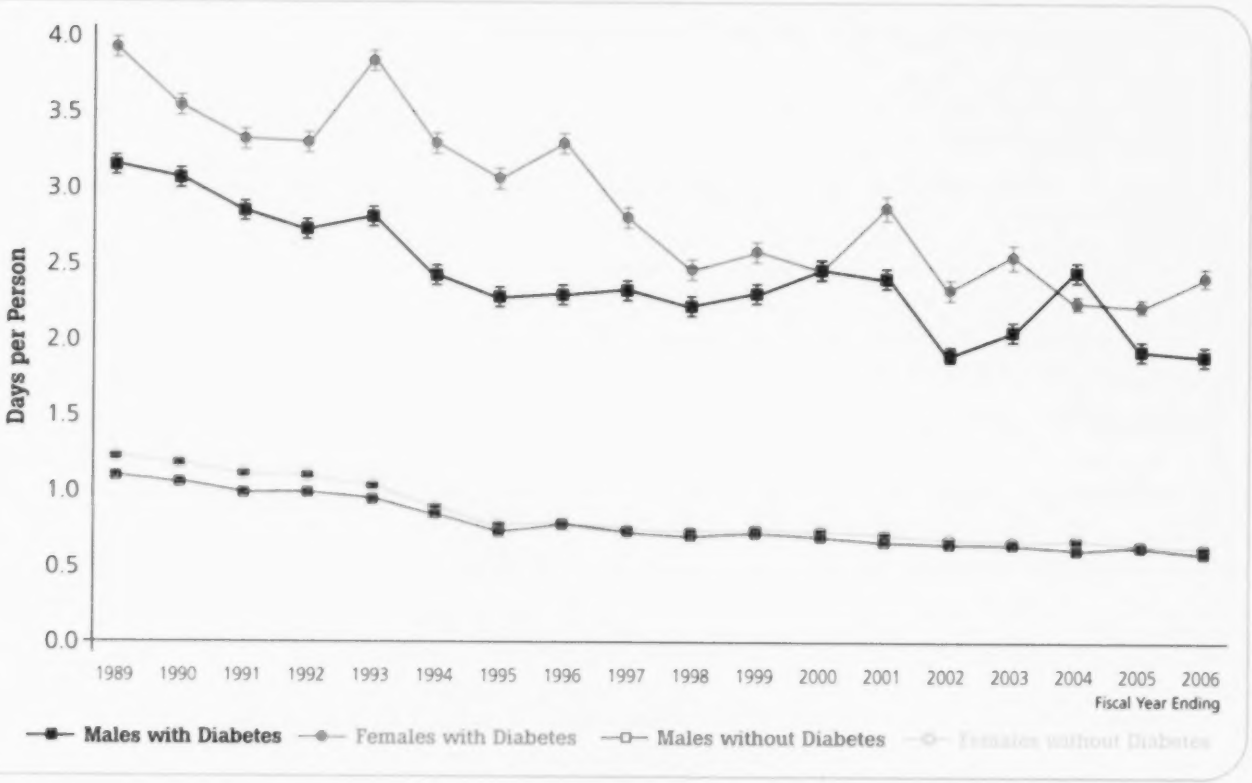


Figure 38: Manitoba Age-adjusted Days of Hospitalization (one year and older) by Sex 1988/89 to 2005/06

- Between 2001/02 and 2005/06, Manitobans ages one year and older with diabetes accounted for about 290,000 hospital days annually. They represented more than one-quarter (27%) of all Manitoba hospital days in each year, compared to 17% diabetes-related hospital days between 1988/89 and 1992/93.
- In the past two decades, age-adjusted days-of-hospitalization rates have significantly declined by about 46% for those without diabetes, and about 40% for those with diabetes.
- Women, both with and without diabetes, had consistently and significantly higher days-of-hospitalization rates than men across all fiscal years, likely due to pregnancy and related events.
- The difference in days-of-hospitalization rates between men and women with diabetes decreased from about 0.7 days, between 1988/89 and 1992/93, to 0.3 days between 2001/02 and 2005/06.
- Associated days-of-hospitalization rate ratios have gradually increased over time. Between 2001/02 and 2005/06 Manitobans with diabetes spent more than three times (3.5) as many days in hospital as Manitobans without diabetes, compared to less than three times as many between 1988/89 and 1992/93.

3.5.3 Days-of-hospitalization Five-year Age-specific Rates 2002 to 2006

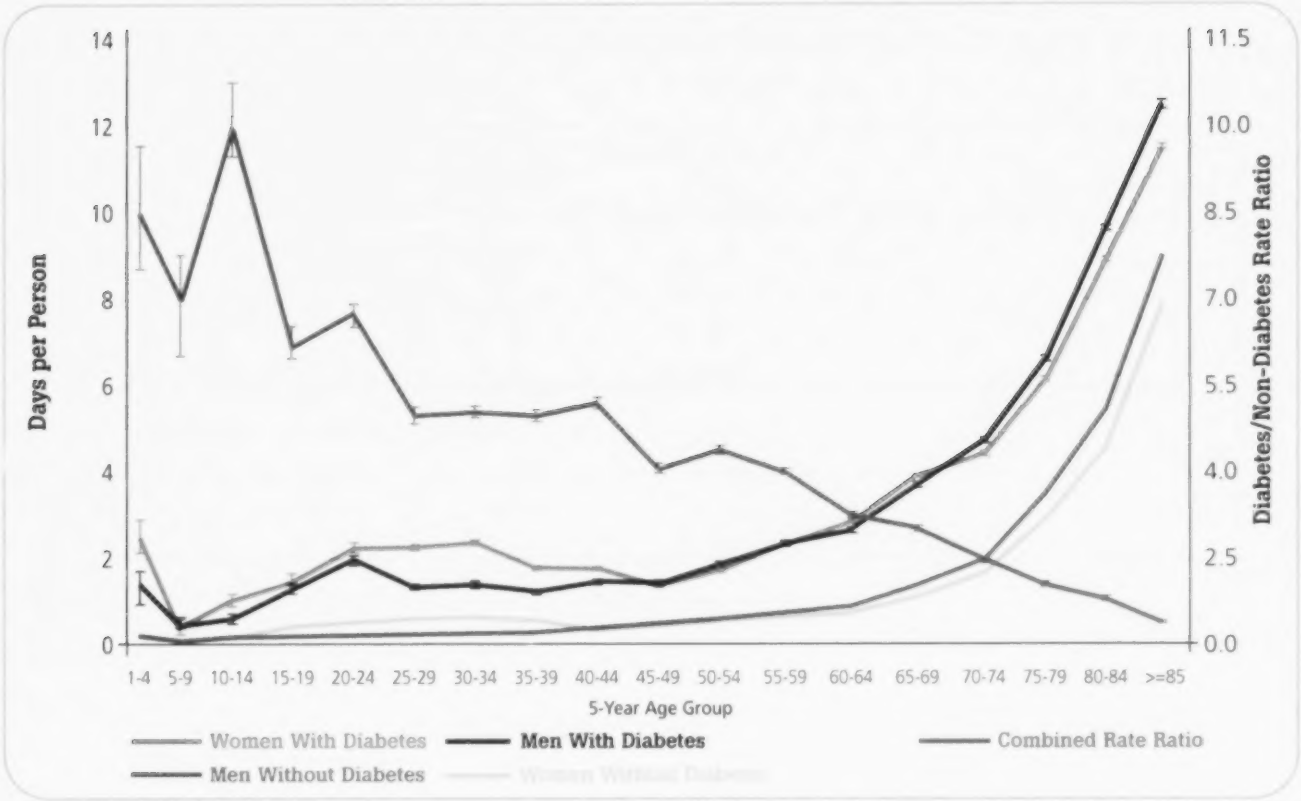


Figure 39: Manitoba Age and Sex-specific Days of Hospitalization 2001/02 to 2005/06

- Days-of-hospitalization rates for people with diabetes are consistently and significantly higher at all ages than days-of-hospitalization rates for those without diabetes, even for children and adolescents.
- Both individuals with and without diabetes have longer hospital stays as they become older. Rates start to increase dramatically after the 55-to-59-year-old age group.
- Days-of-hospitalization rates are elevated for young females, perhaps reflecting higher health care use in general among females in the childbearing years. This is also reflected in a narrower gap between young women, with and without diabetes, than for males in the same age groups.
- Age-specific days-of-hospitalization rate ratios are significantly higher for Manitoba women than for men older than 60 years of age.
- The days-of-hospitalization rate ratios demonstrate that younger people with diabetes have higher hospital use than older individuals who have diabetes, compared to those without diabetes in the same age group. For example, Manitobans with diabetes between the ages of 20 and 24 years old spent almost seven times as many days in hospital than the same age group without diabetes. In the age groups 65 years and older, those with diabetes spent less than three times as many days in hospital than those without diabetes in the same older age groups.

3.5.4 Days of Hospitalization in Regional Health Authorities 2002 to 2006

Regional Days-of-hospitalization Rates

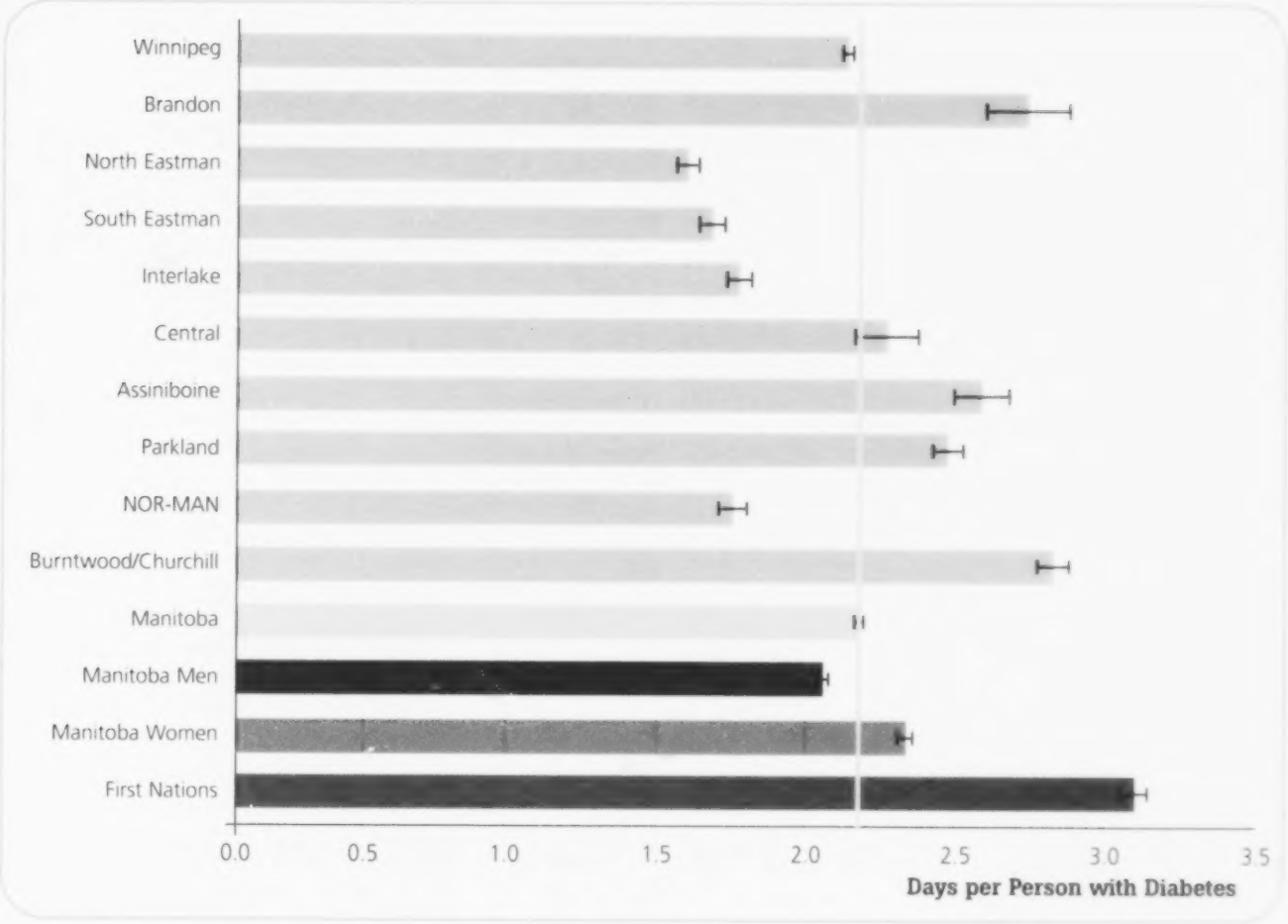


Figure 40: Age-adjusted Days-of-hospitalization Rates with Diabetes 2001/02 to 2005/06

- Age-adjusted days-of-hospitalization rates were significantly lower than the Manitoba rate in North Eastman, South Eastman, Interlake and NOR-MAN regions.
- Age-adjusted days-of-hospitalization rates were significantly higher than the Manitoba rate in Brandon, Assiniboine, Parkland and Burntwood/Churchill regions.
- Age-adjusted days-of-hospitalization rates in First Nations people with diabetes were more than 40% higher than in the overall Manitoba population with diabetes.

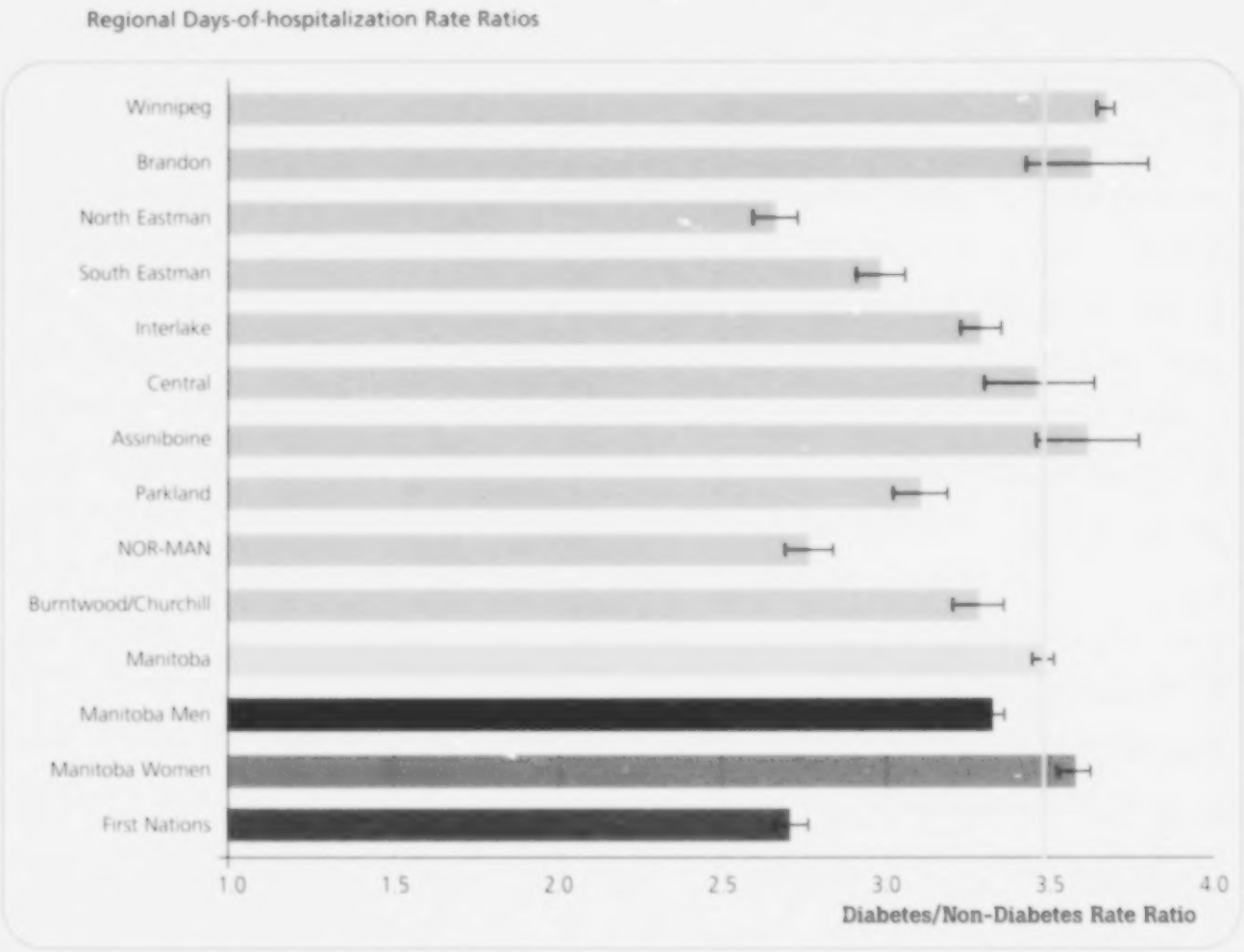


Figure 41: Days-of-hospitalization Rate Ratios 2001/02 to 2005/06

- Diabetes/non-diabetes days-of-hospitalization rate ratios reflect the burden of diabetes on hospital services use in the population as a whole. They may be interpreted as the relative risk of longer length of stays in hospitals.
- North Eastman, South Eastman, Interlake, Parkland, NOR-MAN and Burntwood/Churchill RHAs had significantly lower diabetes days-of-hospitalization rate ratios than Manitoba as a whole.
- Winnipeg RHA had a significantly higher diabetes days-of-hospitalization rate ratios than Manitoba as a whole.
- The days-of-hospitalization rate ratio among people with diabetes, compared to those without, was significantly higher for women than for men.
- The days-of-hospitalization rate ratio among people with diabetes, compared to those without, was significantly lower for First Nations people than for the whole Manitoba population.

3.5.5 Key Results

- Manitobans with diabetes accounted for more than one-quarter of all Manitoba days of hospitalization in each year between 2002 and 2006, compared to 17% of hospital days between 1989 and 1993.
- In the past two decades, age-adjusted days-of-hospitalization rates have significantly declined by about 46% for those without diabetes, and about 40% for those with diabetes.
- Between 2002 and 2006, Manitobans with diabetes spent more than three times (3.5) as many days in hospital as Manitobans without diabetes.
- The days-of-hospitalization rate ratios demonstrate that younger people with diabetes have higher hospital use than older individuals who have diabetes, when compared to those without diabetes in the same age groups.
- The days-of-hospitalization ratio among people with diabetes, compared to those without, was significantly lower for First Nations people than for the whole Manitoba population. Age-adjusted days-of-hospitalization rates for First Nations people with diabetes were about 40% higher than in the overall Manitoba population with diabetes.

3.6 Physician Visits

3.6.1 Definition

One measure of health system use is the number of visits to physicians. This includes billed visits and also visits to salaried physicians that were tracked through shadow billing. NDSS physician visits analyses are based on ALL causes of physician services and not just visits due to diabetes. Physician visits may also be differentiated by general practitioner and specialist services.

Similar to mortality rates and rate ratios, age-adjusted rates and rate ratios are calculated for physician visits by substituting the number of visits for deaths. Physician-visits rate ratios reflect the higher number of physician visits in the population with diabetes compared to the population without diabetes.

$$\text{Physician-visits rate (with diabetes)} = \frac{\text{Total number of physician visits by people with diabetes during the current fiscal year}}{\text{Total number of people with diabetes during the current fiscal year}}$$

$$\text{Physician-visits rate (without diabetes)} = \frac{\text{Total number of physician visits by people without diabetes during the current fiscal year}}{\text{Total number of people without diabetes during the current fiscal year}}$$

$$\text{Physician-visits rate ratio} = \frac{\text{Physician-visits rate among people with diabetes}}{\text{Physician-visits rate among people without diabetes}}$$

3.6.2 Physician-visits Rates 1988/89 to 2005/06

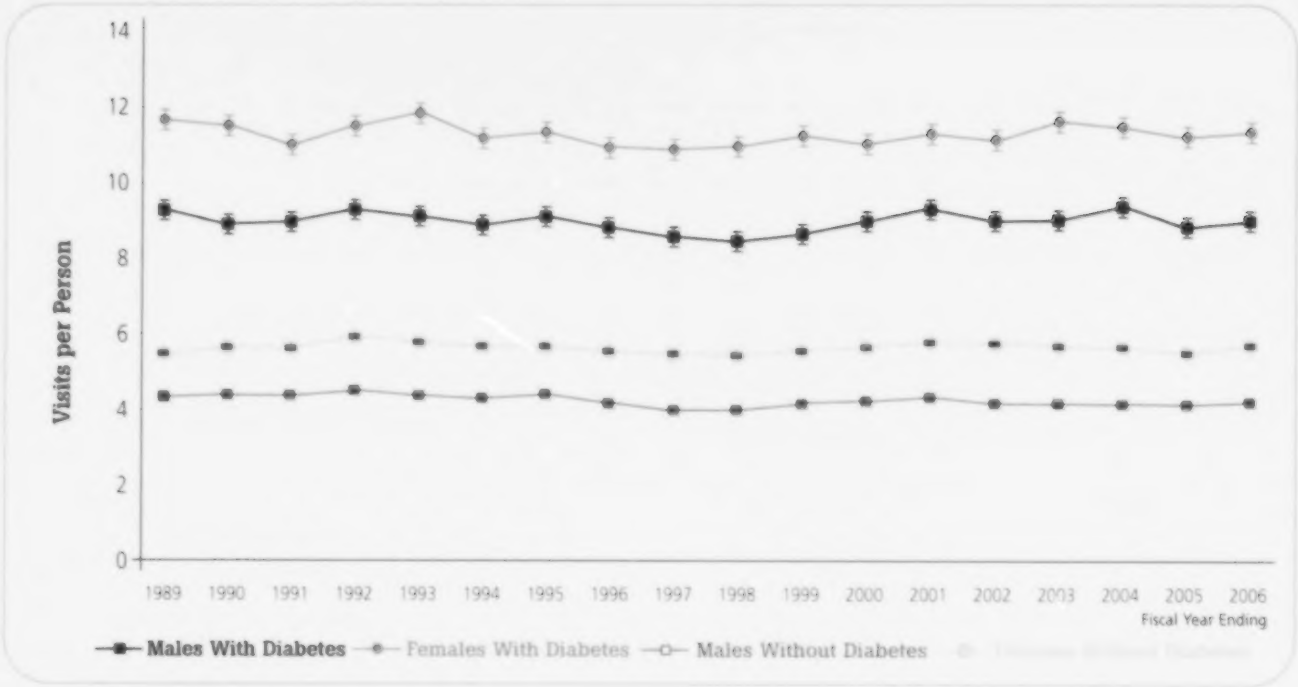


Figure 42: Manitoba Age-adjusted Physician Visits (one year and older) 1988/89 to 2005/06

- Between 2001/02 and 2005/06, Manitobans one year of age and older with diabetes accounted for more than 900,000 visits to physicians annually. They represented 14% of all Manitoba physician visits in each year, double the 7% diabetes-related physician visits between 1988/89 and 1992/93.
- In the past two decades, age-adjusted physician-visits rates have been consistent at around 10 visits per year for each person with diabetes, on average.
- Females, both with and without diabetes, had consistently and significantly higher physician-visits rates than males across all fiscal years, with about 2.5 more visits per year for females with diabetes.
- Associated physician-visits rate ratios have also remained constant over time. Between 1988/89 and 2005/06, Manitobans with diabetes visited physicians more than two times (2.17) as often as Manitobans without.

3.6.3 Physician Visits Five-year Age-specific Rates 2002 to 2006

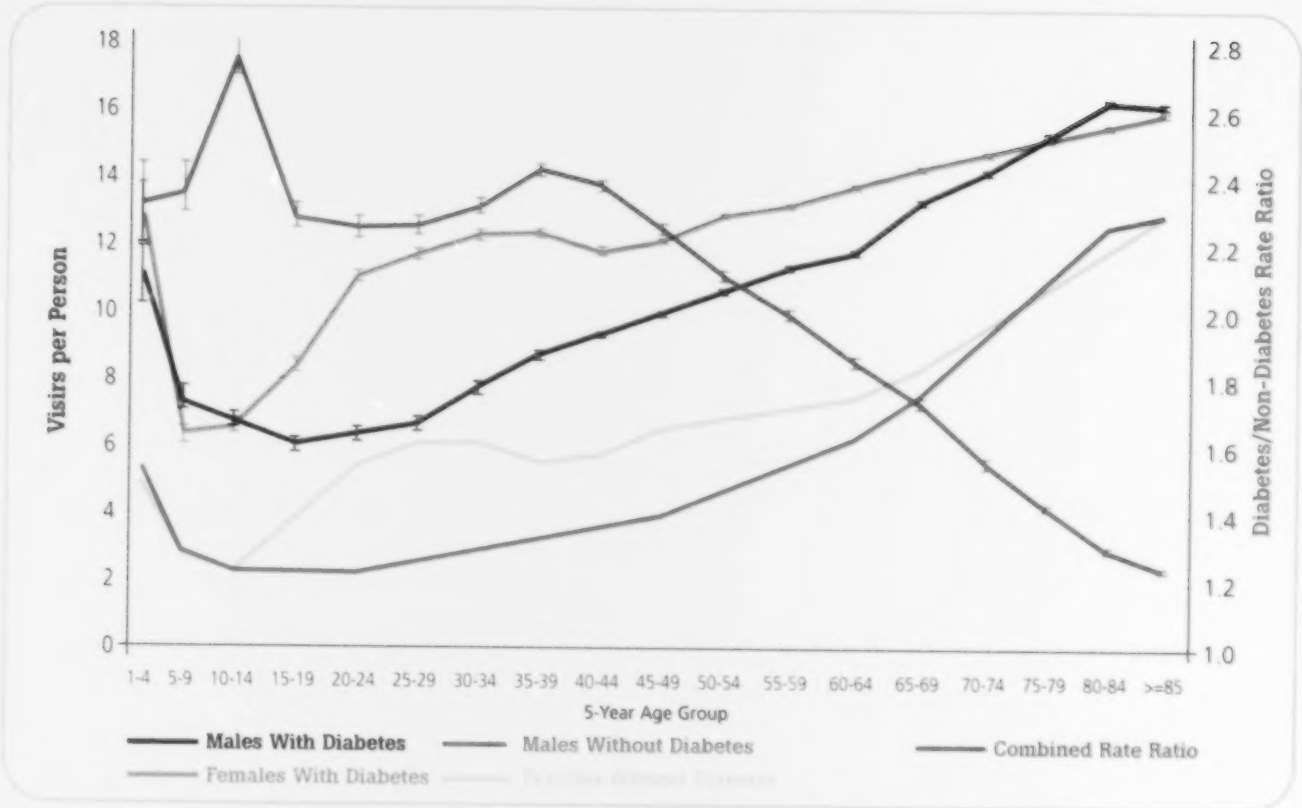


Figure 43: Manitoba Age and Sex-specific Physician Visits 2001/02 to 2005/06

- Physician-visits rates for people with diabetes are consistently and significantly higher at all ages than physician-visits rates for those without, even for children and adolescents.
- Both individuals with and without diabetes have more physician visits as they become older, with rates increasing gradually from the 15-to-19-year-old age group.
- Physician-visits rates are higher for females between the ages of 10 and 79 years. They are further elevated for young women, perhaps reflecting higher health care use in general among women in the childbearing years.
- Age-specific physician-visits rate ratios are significantly higher for Manitoba men than for women who are younger than 60 years of age. For older Manitobans, there is no rate ratio difference between the sexes.
- The physician-visits rate ratios demonstrate that younger people with diabetes have more physician visits than older individuals who have diabetes when compared to those without diabetes, in the same age groups. For example, 35-to-39-year-old Manitobans with diabetes visited physicians more than twice as often as those in the same age group without diabetes. People with diabetes, 65 years old and older, visited physicians less than 1.5 times as often as those without diabetes, in the same older age groups.

3.6.4 Age and Sex-specific Physician-visits Rate Ratios by Practice Type 2002 to 2006

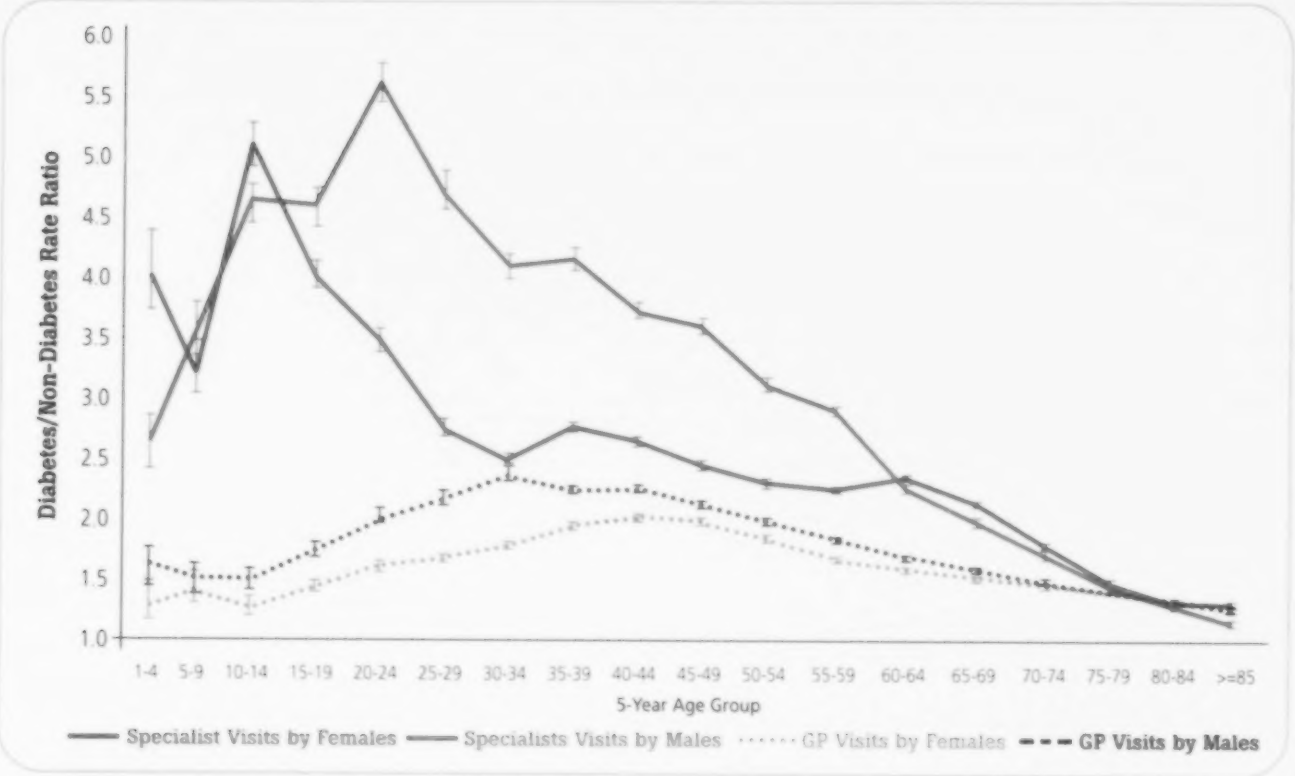


Figure 44: Manitoba Age and Sex-specific Physician Visits by Practice Type 2001/02 to 2005/06

- There are significant differences in physician-visits ratio patterns between general practitioners (GP) and specialists.
- Specialist use by people with diabetes, compared to those without diabetes, is significantly higher than GP use for people younger than 80 years old.
- GP use ratios of males are significantly higher than GP use ratios of females for GP visits between the ages of 15 and 64 years and for specialist visits between the ages of 10 and 69 years.
- Specialist-use rate ratios are highest for 15-to-19-year-old females and 20-to-24-year-old males, and then decline gradually.
- GP-use rate ratios are low in childhood, reach their peak in the 30s age group, and then start declining again.

3.6.5 Physician Visits in Regional Health Authorities 2002 to 2006

Regional Physician-visits Rates

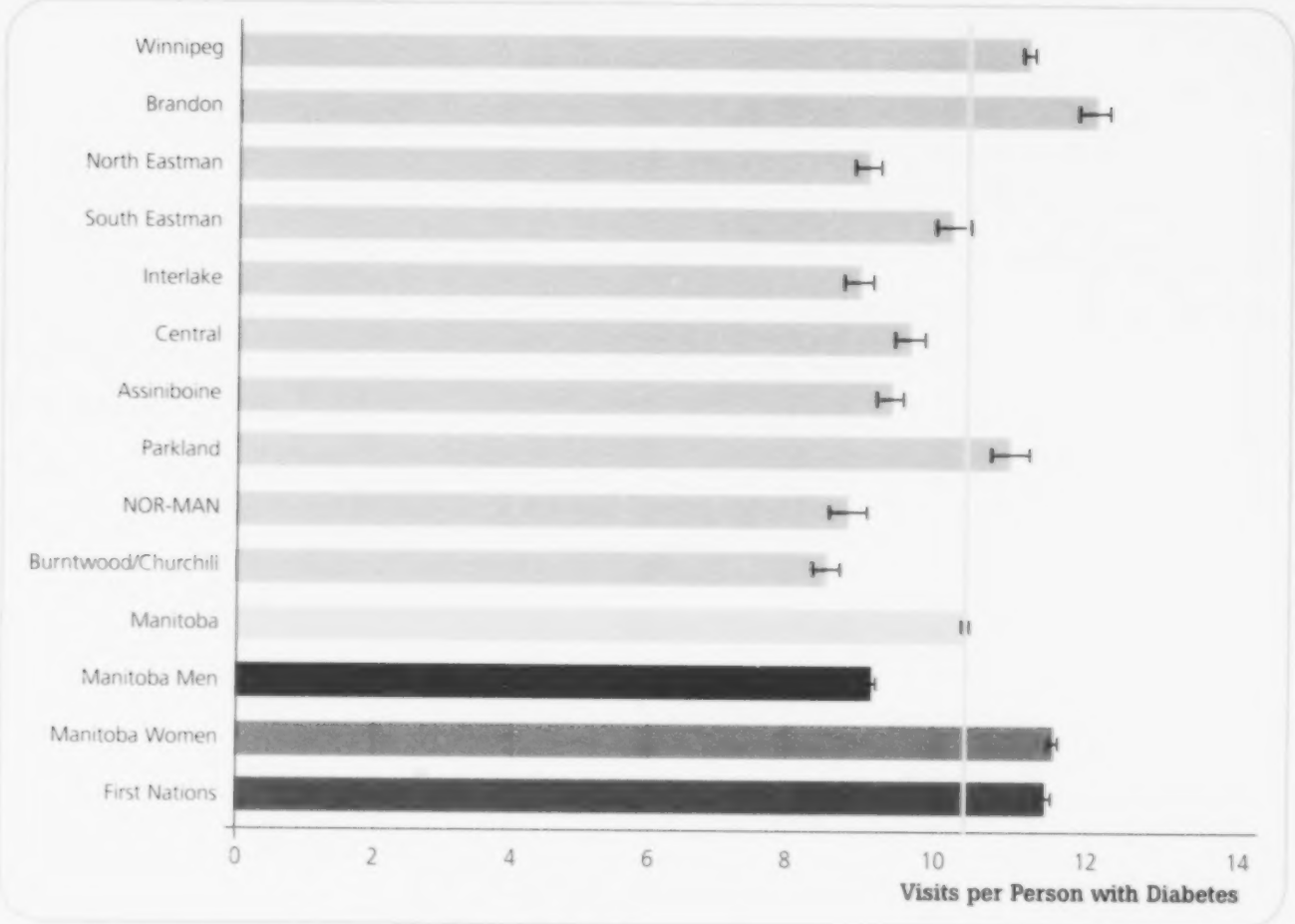


Figure 45: Age-adjusted Physician-visits Rates with Diabetes 2001/02 to 2005/06

- Age-adjusted physician-visits rates were significantly lower than the Manitoba rate in North Eastman, Interlake, Central, Assiniboine, NOR-MAN and Burntwood/Churchill regions.
- Age-adjusted physician-visits rates were significantly higher than the Manitoba rate for people with diabetes living in Winnipeg, Brandon, and Parkland regions.
- Age-adjusted physician-visits rates were significantly higher for Manitoba females than for Manitoba males.
- Age-adjusted physician-visits rates in First Nations people with diabetes were about 10% higher than in the overall Manitoba population with diabetes.

Regional Physician-visits Rate Ratios

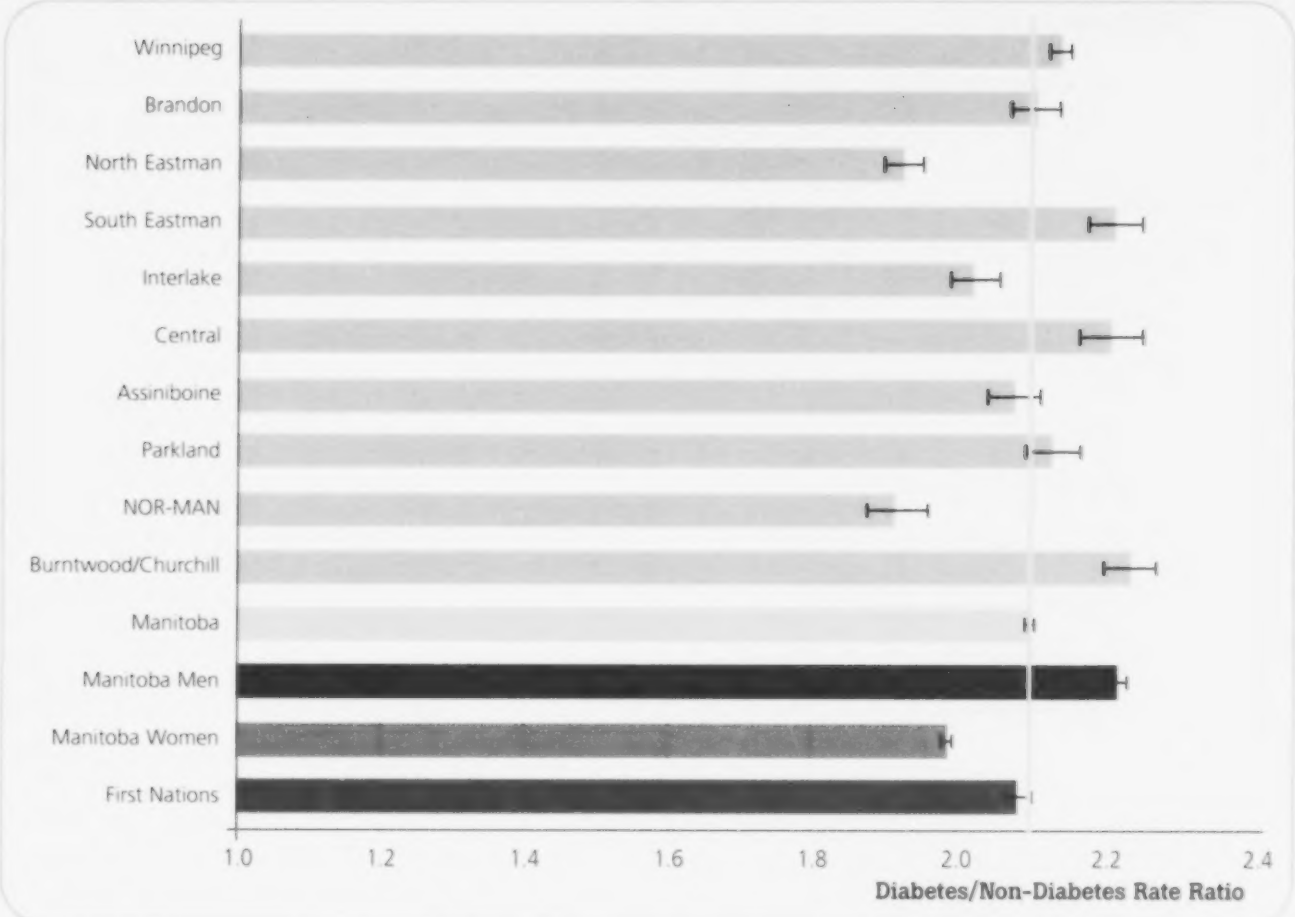


Figure 46: Physician-visits Rate Ratios 2001/02 to 2005/06

- Physician-visits rate ratios reflect the burden of diabetes on physician visits in the population as a whole. They may be interpreted as the relative risk of more frequent physician visits for people diagnosed with diabetes compared to those without diabetes.
- North Eastman, Interlake, and NOR-MAN RHAs had significantly lower diabetes physician-visits rate ratios than Manitoba as a whole.
- Winnipeg, South Eastman, Central and Burntwood/Churchill RHAs had significantly higher diabetes physician-visits rate ratios than Manitoba as a whole.
- Physician-visits rate ratios among people with diabetes, compared to those without, were significantly higher for Manitoba men than for women.

3.6.6 Key Results

- Manitobans with diabetes accounted for 14% of all Manitoba physician visits in each year between 2002 and 2006. This is double the 7% diabetes-related physician visits between 1989 and 1993.
- Physician-visits rate ratios have changed little over time. Between 1989 and 2006 Manitobans with diabetes visited physicians more than two times (2.2) as often as Manitobans without diabetes.
- Physician-visits rate ratios demonstrate that younger people with diabetes have more physician visits than older individuals who have diabetes, when compared to those without diabetes in the same age groups.
- Females, both with and without diabetes, had consistently and significantly higher physician-visit rates than males across all fiscal years. There were about 2.5 more visits per year for females with diabetes.

Manitoba Diabetes Prevalence Projections

4 Manitoba Diabetes Prevalence Projections 2007 to 2016

4.1 Introduction

4.1.1 Diabetes Prevalence Projections Method

- The Manitoba Diabetes Prevalence Projections 2007 to 2016 are an update of more detailed projections provided in JF Blanchard JF, A Wajda A, and C Green: *Epidemiologic Projections of Diabetes and Its Complications: Forecasting the Coming Storm*. (Winnipeg, MB: Manitoba Health; 1998)[1].

- Projected diabetes cases for each future year were determined as follows:
  1. Existing prevalent cases in each five-year age group were aged by one year, according to the proportion of the oldest year in each group in the projected total population, beginning with prevalent cases.
  2. New cases were added each year based on three scenarios of variable incidence rates multiplied for each five-year age group by Manitoba Bureau of Statistics Population Projections, 2006 to 2036 (http://health.internal/hig/population_numbers.htm).
  3. Cases were removed in each projected year based on the average 2001/02 to 2005/06 age-specific diabetes mortality rates for each five-year age group, multiplied by the number of projected prevalent cases from Step 1.

[1] *Epidemiologic Projections of Diabetes and Its Complications: Forecasting the Coming Storm* (http://www.gov.mb.ca/health/chronicdisease/diabetes/docs/storm.pdf)

4.1.2 Variable Rate Scenarios

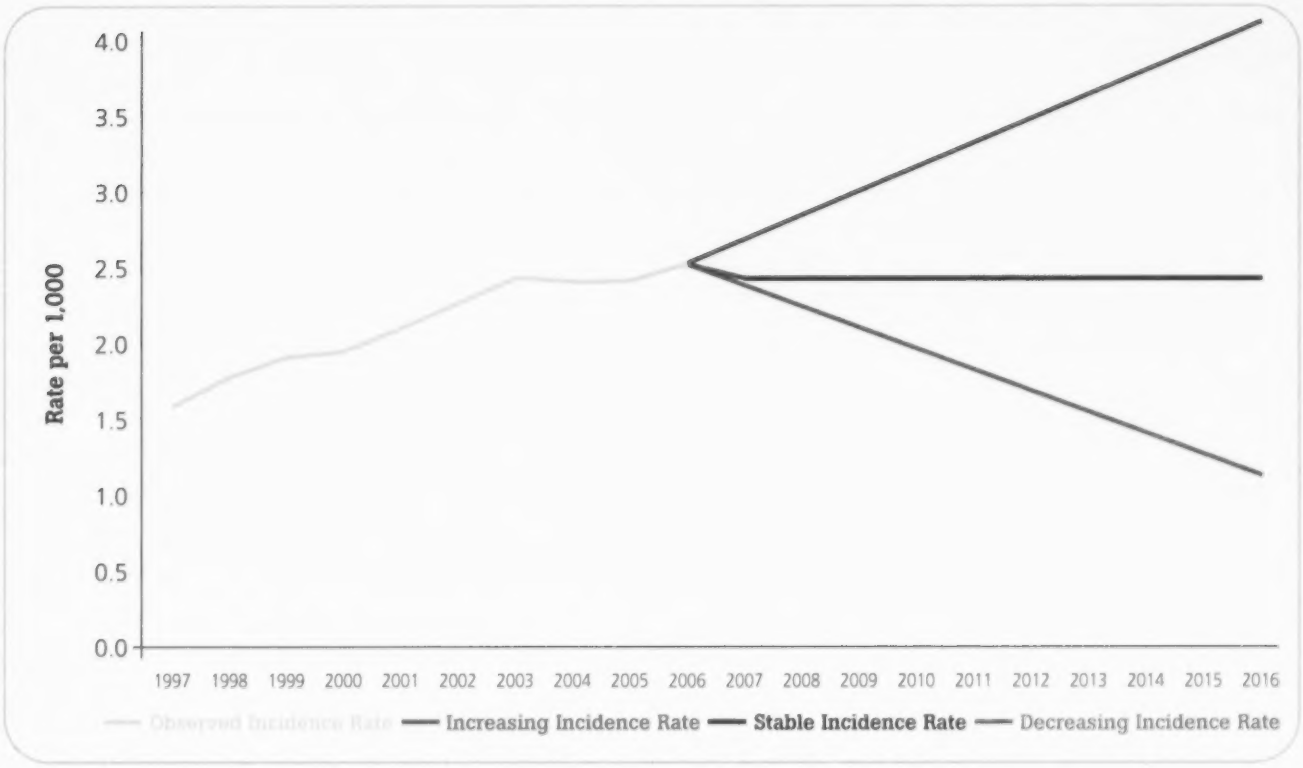


Figure 47: Manitoba Incidence Rates One to 49 years of Age, Prevention Scenarios 1997 to 2016

- Incidence or mortality rate changes may be used to explore the impact of prevention strategies, diagnostic criteria or screening guideline changes. They may also be used to explore improvements in diabetes management and care on diabetes prevalence projections.
- Projections in this report focus on incidence rate changes in people younger than 50 years old. This reflects historic changes in incidence rates which may be associated with changes in population BMI changes and related prevention efforts.

1. **SCENARIO 1** (low prevention) reflects the observed doubling of incidence rates in one-to-49-year-olds from 1.2 per 1,000 in 1990 to 2.4 per 1,000 in 2003, as a linear increase of about 4% per year. This diabetes incidence rate increase roughly parallels rising obesity rates in Manitoba in the 1980s and 1990s, when the proportion of adult BMI > 27 more than doubled from about 16% in 1985 to 36% in 2001.
2. **SCENARIO 2** (medium prevention) uses the most recent average five-year incidence rate of 2.4 per 1,000 between 2001/02 and 2005/06. This may reflect the more recent stabilization of overweight/obesity (BMI > 25) at about 53% in Manitoba between CCHS 2003 and 2007.
3. **SCENARIO 3** (high prevention) assumes an aggressive reduction of diabetes incidence rates by 8% per year to about 1.2 per 1,000 by 2016.

4.2 Results

4.2.1 Observed and Projected Prevalent Diabetes Cases 1997 to 2016

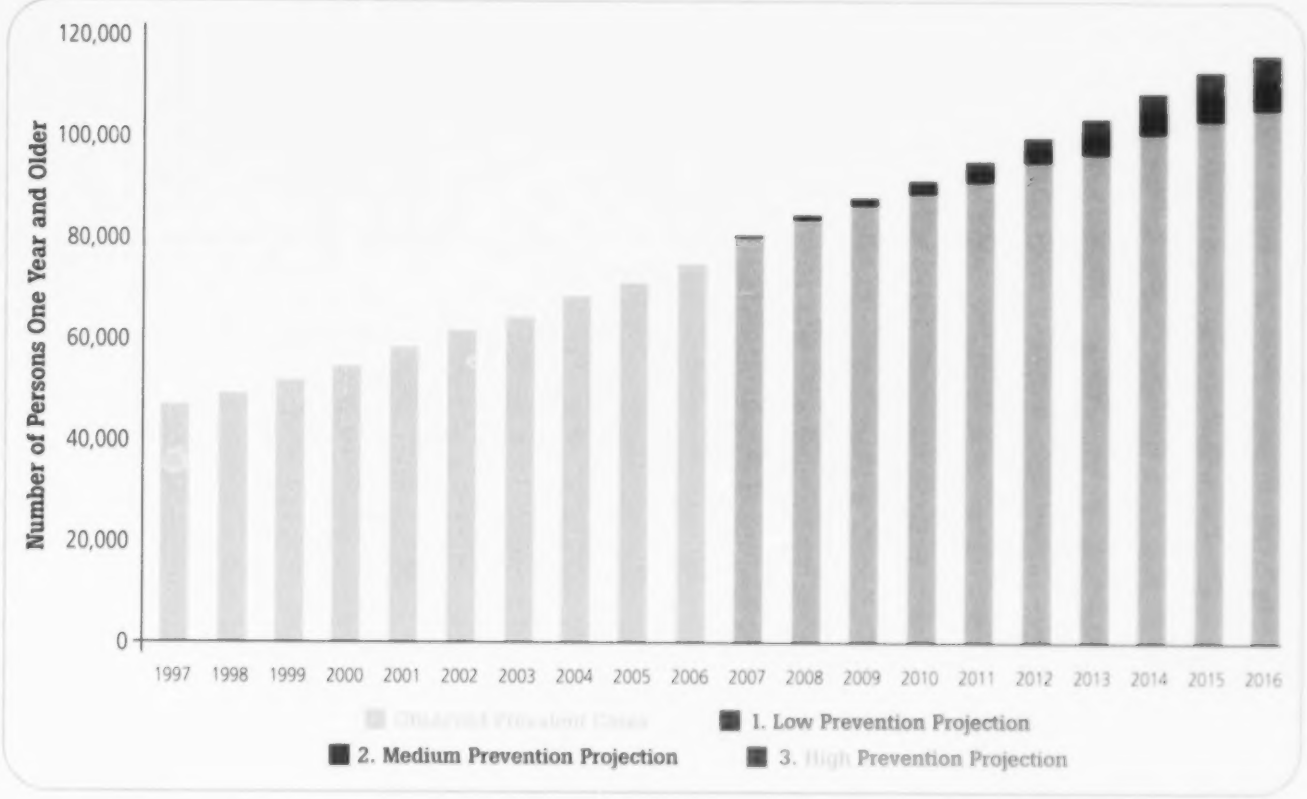


Figure 48: Manitoba Observed and Projected Diabetes Cases 1997 to 2016

- By 2016, we can expect a doubling of prevalent diabetes cases from the number of cases prevalent around 2000, depending on prevention scenario.
- If incidence rates continue to increase as they have during the 1990s, there will be about 116,000 Manitobans with diabetes by 2016, representing about 9% of the population.
- If current prevention efforts and obesity levels prevail, and incidence rates remain constant, there will be about 111,000 Manitobans with diabetes by 2016, representing about 8.5% of the population.
- If intensified prevention efforts can reverse obesity and diabetes incidence rate trends back to the levels of the late 1980s, there will be about 105,000 Manitobans with diabetes by 2016, representing about 8% of the Manitoba population.
- These projections are conservative because potential lowering of diagnostic criteria for diabetes and enhanced screening may increase incidence rates. Also, improvements in diabetes management and care may lower mortality rates. These effects may lead to considerably higher numbers of diabetes cases in the future than are projected here.

4.2.2 Observed and Projected Diabetes Cases by Age Group 1997, 2006 and 2016

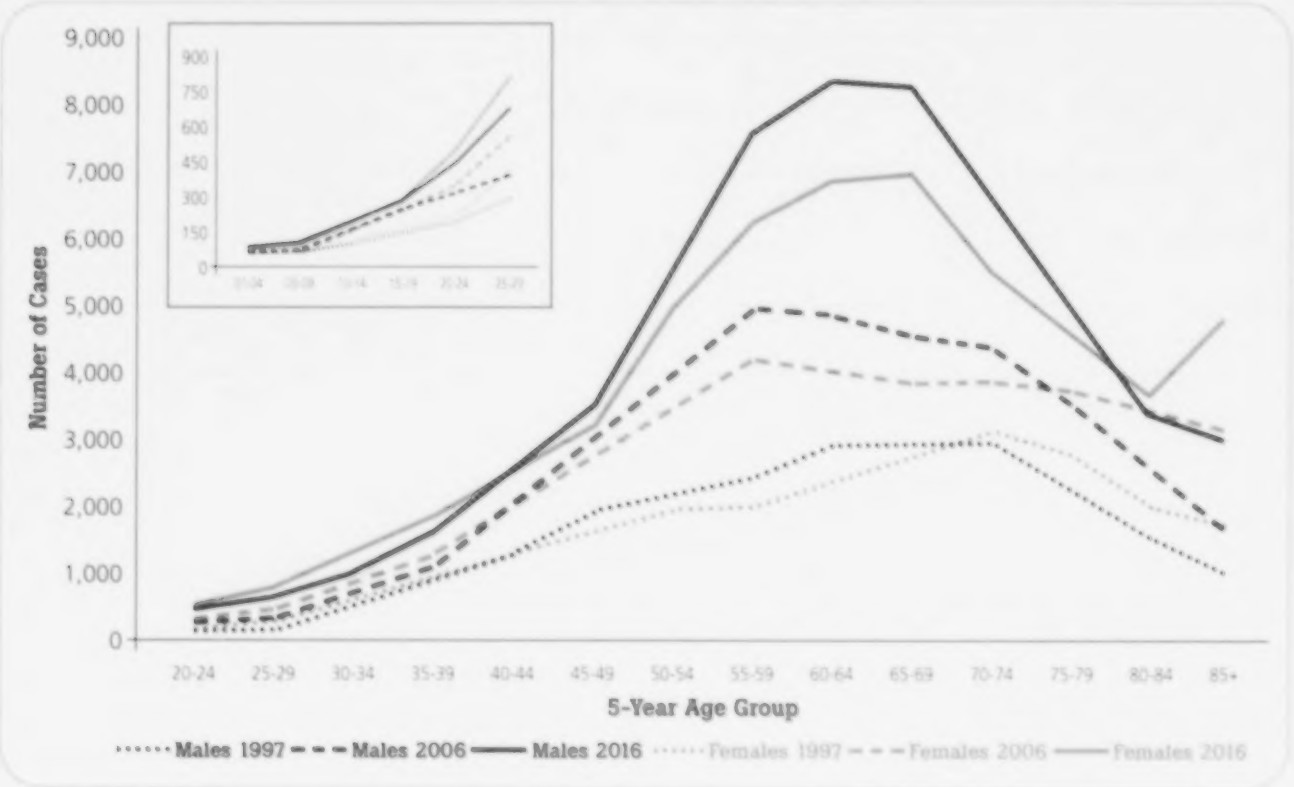


Figure 49: Observed and Projected Diabetes Prevalence Counts by Sex and Age, Manitoba 1997, 2006, and 2016

- Observed and projected counts of prevalent diabetes by sex and age group reflect population growth and, to a larger extent, an aging population.
- 2006 and 2016 age-specific diabetes prevalence was projected based on five-year (2001/02 to 2005/06) average incidence and mortality rates.
- Diabetes prevalence in women is higher than in men for the 44 year old and younger age group.
- Due to longer life expectancy, there will be more women than men with diabetes in the older age groups. The age group where the number of women with diabetes exceeds the number of men will be shifting from 70-to-74-year-olds in 1997, to 80-to-84-year-olds in 2016.
- By 2016, the largest numbers of diabetes cases will occur in 60-to-69-year-olds for both males and females. Otherwise, the age and sex distribution of projected prevalent diabetes cases will be similar to those observed in 1997 and 2006.

4.2.3 Projected Diabetes Five-year Age-specific Rates 2006 and 2016

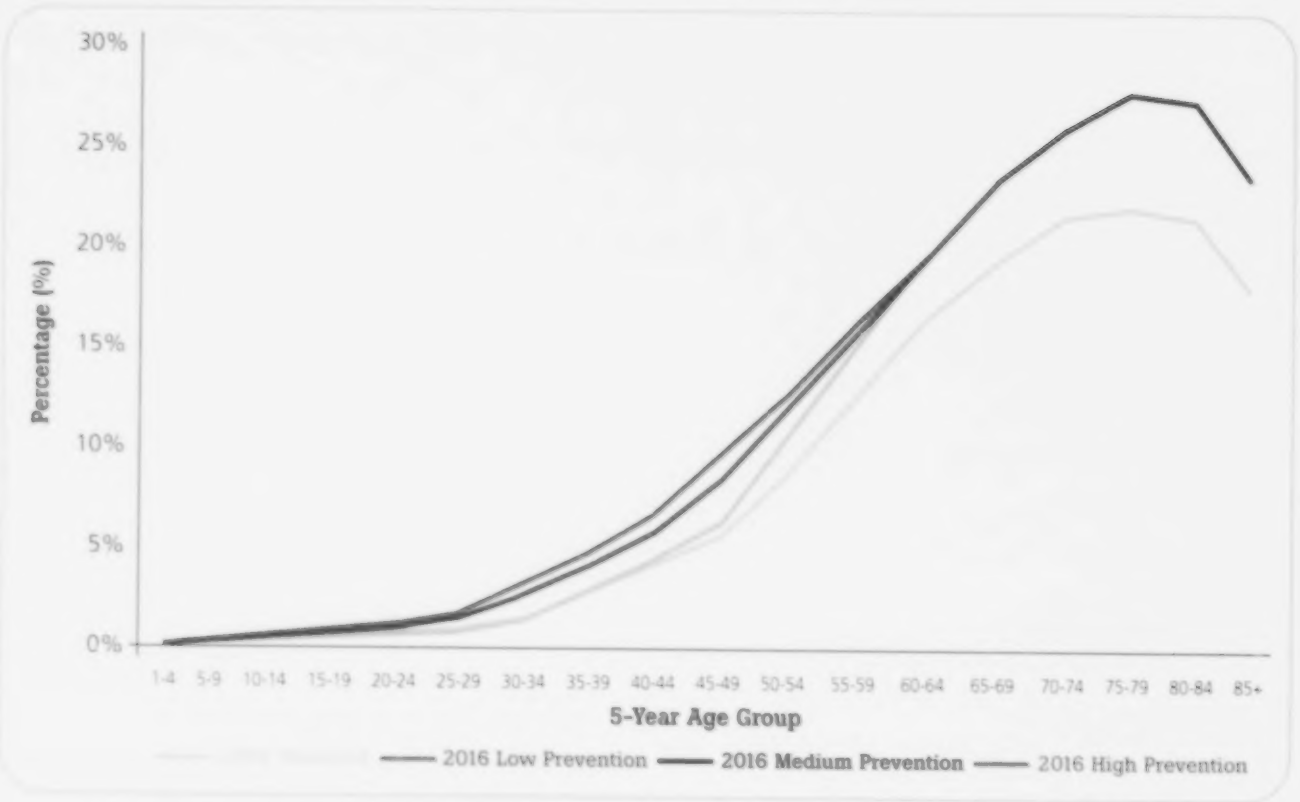


Figure 50: Manitoba Diabetes Prevalence Projections, Age-specific Rates for Variable Incidence Rates

- The number of diabetes cases is projected to increase by about 78% in the 60-to-69-years age group, from 2006 to 2016.
- More than a quarter (26%) of the Manitoba population older than 70 years of age is projected to have diabetes by 2016.
- The increase of diabetes in older age groups (50+) is expected to bring with it a comparable increase in diabetes complications, such as circulatory system disease and chronic kidney disease and also use of health care resources at a much higher rate.
- The impact of different prevention scenarios on the population younger than 50 years of age will be most pronounced for the 30-to-55-year age groups, with a difference of 8,000 cases between the low prevention scenario and the high prevention scenario.
- Related age-specific rates in the 45-to-49-year age groups will be almost 10% for the low prevention scenario and about 6% for the high prevention scenario respectively.

4.2.4 Projected Regional Diabetes Prevalence Changes, 2006 to 2016

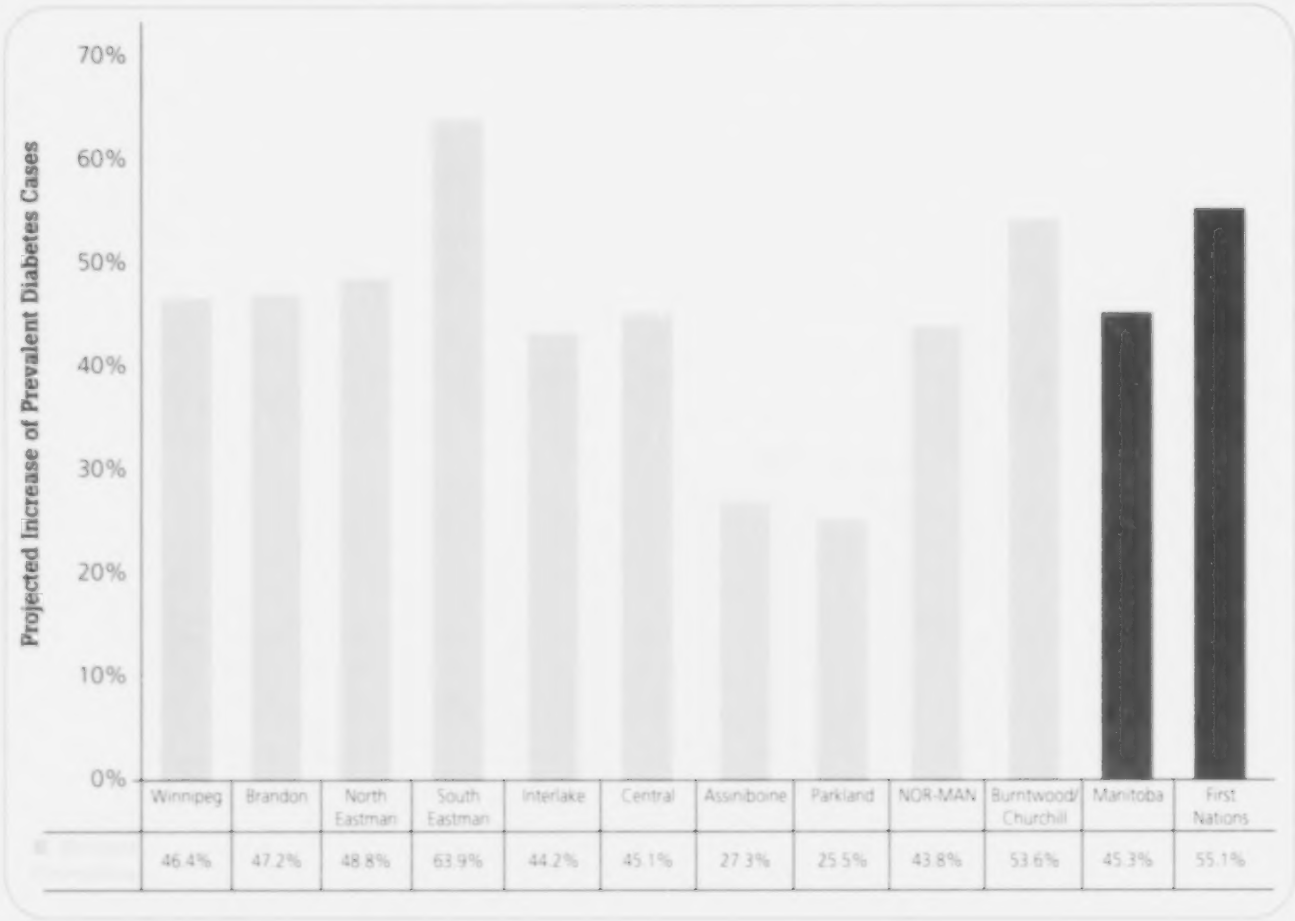


Figure 51: Projected Diabetes Prevalent Cases Growth 2006 to 2016 by Health Authority

- Regional diabetes prevalence projections were based on five-year average regional incidence and mortality rates because incidence rate changes, over time, were not determined.
- The proportional increases in prevalent diabetes cases will be different for the various Manitoba regional health authorities, which may have to allocate resources for this added burden of chronic disease. Different rates of increase are mainly driven by the different regional demographic structures and resulting population projections.
- Regions with populations that are relatively older than the population of Manitoba as a whole in 2006 and that have projected population losses, such as Assiniboine and Parkland regions, may experience smaller increases in the number of prevalent diabetes cases (less than 30%) than the Manitoba increase of about 45%.
- Populations that are relatively younger than Manitoba as a whole in 2006 and that have large projected growth, such as South Eastman region or First Nations people, may experience considerably larger increases in the number of prevalent diabetes cases: higher than 50%, or up to 64% in South Eastman region.

4.3 Key Results

- The future prevalence of diabetes in Manitoba may be projected based on surveillance prevalence cases, incidence and mortality rates, and population projections.
- If current prevention efforts and obesity levels prevail and incidence rates remain constant at the levels observed between 2002 and 2006, then it is projected that there will be about 111,000 Manitobans with diabetes by 2016, representing about 8.5% of the population. This is about twice the number of Manitobans with diabetes in the year 2000.
- If incidence rates continue to increase as they have during the 1990s, then the projections indicate about 116,000 Manitobans will be living with diabetes by 2016, representing 9% of the population.
- The number of diabetes cases is projected to increase by about 78% in the 60-to-69-year age group from 2006 to 2016, with more than one-quarter (26%) of the Manitoba population older than 70 years of age with diabetes by 2016.

Report
Discussion/Analysis

5 Report Discussion/Analysis

This section analyzes the surveillance information on diabetes and its consequences focusing on changes in time, differences between men and women, elevated rates in First Nations people and regional differences.

5.1 Diabetes and its Consequences over Time

One of the objectives of chronic disease surveillance is the tracking of disease-related events over time. In Manitoba, the number of people with diabetes has more than doubled from 32,468 (or 2.8% of Manitobans) in 1989, to 76,608 or (6.4% of Manitobans) one year of age and older, in 2006.

The number of people with diabetes in any year is changed by new diabetes diagnoses and by deaths of people with diabetes. The numbers of annual new diabetes cases were relatively stable between 1989 and 1997, at an average of about 3,920 per year, or 3.5 per 1,000 Manitobans. By 1998, the annual number of new cases started to increase sharply to an average of about 6,390 new cases per year between 2002 and 2006 (or 5.7 new cases per 1,000 Manitobans). This jump in the rate of diagnoses was likely associated with the publication of new criteria for screening and diagnosis of diabetes in 1998. For Manitobans between one and 49 years of age, the rate of new diabetes cases has gradually doubled from 1.2 per 1,000 in 1990 to 2.4 per 1,000 in 2003. This rate increase roughly parallels rising obesity rates in Manitoba in the 1980s and 1990s. At that time the proportion of adults with Body Mass Index higher than 27 more than doubled from about 16% in 1985 to 36% in 2001[8].

The number of new people diagnosed with diabetes has been about 2.5 times higher than the number of diabetes-related deaths in each year; therefore, the number of people with diabetes has been increasing steadily. The average number of deaths of people with diabetes has increased from about 1,579 per year (between 1989 and 1993), to an average of about 2,540 deaths of person with diabetes (between 2002 and 2006). However, the annual rate of death has been declining from an average of about 17 deaths per 1,000 diabetes cases (between 1989 and 1993), to 15 deaths per 1,000 diabetes cases (between 2002 and 2006). In the past two decades, the overall rates of death have consistently been more than twice as high in the population with diabetes compared to those without diabetes. This ratio between the two rates reflects the significance of diabetes on overall mortality.

The future number of Manitobans with diabetes may be projected based on the current number of cases, the rate of new cases per year, the rate of death among people with diabetes, and population projections. If current prevention and diabetes care efforts and obesity levels prevail and rates remain constant, there will be about 111,000 Manitobans with diabetes by 2016, representing about 8.5% of the population. This is about twice the number of Manitobans who had diabetes in 2000. If intensified prevention efforts can reverse risk factors, such as obesity, and reduce the rate of new diabetes cases back to the levels of the late 1980s, there will be about 105,000 Manitobans with diabetes by 2016 (about 8% of the Manitoba population).

[8] Colman, R. (2000) *Cost of Obesity in Manitoba*. GPI Atlantic.

The projected increase in the number of people with diabetes can be expected to bring with it a comparable increase in diabetes complications and use of health care resources. Diabetes complications addressed in this report include hospital visits due to lower limb amputations, chronic kidney disease and diseases of the circulatory system (heart disease and stroke). Diabetes-related health care resource uses described in this report include hospital lengths of stay and physician visits. The increasing burden of diabetes is reflected in rising proportions of diabetes cases for these consequences between 1989 and 2004: from 34% to 50% of chronic kidney disease hospitalizations, from 23% to 31% of heart disease and stroke hospitalizations, from 17% to 27% of days of hospitalization, and from 7% to 14% of all physician visits. More details on consequences of diabetes are summarized below:

- Annual lower limb amputation-related hospital visits varied around two or three amputations per 1,000 diabetes cases until 1996, but have gradually declined since 1997. Lower limb amputation hospitalization was 16 to 41 times more likely to occur in people with diabetes than in people without, between 1989 and 2004, after adjusting for age.

- There have been no significant trends in chronic kidney disease hospitalizations for people with diabetes since 1994. Annual chronic kidney disease hospital visits varied around eight or nine per 1,000 diabetes cases. People with diabetes were about nine to 11 times more likely to have a chronic kidney disease hospital diagnosis than people without diabetes between 1993 and 2004, after adjusting for age.

- Heart disease and stroke hospital-diagnosis rates among people with diabetes have gradually and significantly decreased over the years from an average of about 68 per 1,000 diabetes cases (between 1989 and 1993) to 58 per 1,000 diabetes cases (between 2000 and 2004). This decrease is part of a general downward trend in heart disease and stroke hospitalization. Between 1989 and 2004, people with diabetes were about 3.5 times more likely to have a heart disease and stroke hospital diagnosis, than people without, after adjusting for age.

- In the past two decades, days-of-hospitalization rates have significantly declined by about 46% for those without diabetes and about 40% for those with diabetes. Associated days-of-hospitalization rate ratios have gradually increased over time: between 2002 and 2006 Manitobans with diabetes spent more than three times (3.5) as many days in hospital as Manitobans without diabetes. This compares to fewer than three times as many, between 1989 and 1993.

- On the other hand, physician-visits rates have shown little variability: around 10 visits per year for each person with diabetes on average in the last two decades. Associated physician-visit rate ratios have also remained constant over time. Between 1989 and 2006, Manitobans with diabetes visited physicians more than two times (2.2) as often as Manitobans without diabetes.

5.2 Diabetes in Men and Women

Diabetes and its consequences are different for men and women in Manitoba. Overall, the rate of males with diabetes has been higher than females. This difference increases from 0.3% in 1989 to 0.7% in 2006. The increasing burden of diabetes in men is also reflected in the decline of the proportion of female cases: 51% in 1989 to 50% in 2006. However, 20-to-24-year-old Manitoba women had significantly higher diabetes rates than men in the same age group. The difference between men and women increased from 0.1% in 1989 to 0.3% in 2006. This higher proportion of cases in females of childbearing age may reflect the increased risk of Type 2 diabetes following gestational diabetes, or it may show that higher health care use by women also increases detection of diabetes. For older age groups, Manitoba men had significantly higher diabetes rates than Manitoba women. The difference between 45-to-64-year-old men and women increased from 0.7% to 1.6%, and from 1.7% to 4.3% between 1989 and 2006, for the group 65 years and older.

Similar to the total number of people with diabetes, the annual rate of new male diabetes cases has been higher than the female rate of new cases. The difference increases from 0.6 per 1,000 in 1989, to 1.2 per 1,000 in 2006. As with the total number of people with diabetes, young Manitoba women (ages 20-to-34-years) had significantly higher numbers of new diagnoses by about 0.5 per 1,000 than young Manitoba men. But by ages 40 years and older, the rates of new diabetes diagnoses in men are starting to be significantly higher than in women.

Men, both with and without diabetes, have consistently and significantly higher death rates than women since 1989. Death rates are similar for younger men and women. Male death rates were significantly higher past age 54 years for those without diabetes, and past age 59 years for those with diabetes. When comparing death rates among people with diabetes, to those without, the rate ratio was significantly higher for women (rate ratio 2.4), than for men (rate ratio 2.0). Death rates for men (17 deaths per 1,000 diabetes cases) were higher than women's death rates (13 deaths per 1,000 diabetes cases) between 2002 and 2006.

The sex differences observed in people with diabetes, new diabetes cases and diabetes deaths are also present in diabetes complications. For example, lower limb amputation was about twice as common in men (2.8 per 1,000 diabetes cases) than in women (1.5 per 1,000 diabetes cases) between 2000 and 2004.

Chronic kidney disease hospitalization rates were similar for younger men and women. However, male rates become significantly higher past age 65 years for those without diabetes, and past age 70 years for those with diabetes. The risk of chronic kidney disease hospitalization among people with diabetes, compared to those without, was almost twice as high for women (rate ratio 12) than for men (rate ratio 7). Age-adjusted chronic kidney disease rates for men with diabetes (8.7 per 1,000 diabetes cases) were about 16% higher than women's rates (7.5 per 1,000 diabetes cases) between 2000 and 2004.

Men with diabetes had an approximately 13% higher risk of heart disease and stroke hospitalization than women with diabetes. There were 62 hospitalizations per 1,000 male diabetes cases, compared to 55 hospitalizations per 1,000 female diabetes cases between 2000 and 2004. Heart disease and stroke hospitalization rates were similar for younger men and women. Male rates become significantly higher past age 54 years for those without diabetes and past age 64 years for those with diabetes. Heart disease and stroke hospitalization risk among people with diabetes, compared to those without, was significantly higher for women (rate ratio 3.7) than for men (rate ratio 3.1) The hospitalization rates for men with diabetes were higher. For women, this risk has substantially declined from a rate ratio of 4.2 between 1989 and 1993, while the heart disease and stroke rate ratio, between men with diabetes and without diabetes, has remained stable.

Higher diabetes, death, heart and stroke and chronic kidney disease hospitalization rates in men suggest an overall higher chronic disease risk for men and potential protective factors for women. However, elevated rate ratios for death, heart and stroke and chronic kidney disease indicate that these protective factors may be reduced in women with diabetes. While the gap between men and women in relative heart and stroke disease risk for people with diabetes, compared to those without diabetes, has been considerably reduced in the last 15 years, it has been consistently twice as high for chronic kidney disease in women as in men. Chronic kidney disease as a complication of diabetes in women may therefore need enhanced attention by researchers and policy makers.

Health resource use is also different for men and for women with diabetes. Women, both with and without diabetes, had consistently and significantly higher days-of-hospitalization rates than men across all fiscal years. The difference in days-of-hospitalization rates between men and women with diabetes decreased from about 0.7 days between 1989 and 1993, to 0.3 days between 2002 and 2006. Days-of-hospitalization rate ratios among people with diabetes, compared to those without, was significantly higher for women (rate ratio 3.6) than for men (rate ratio 3.3). Days-of-hospitalization rates were significantly higher for Manitoba females (2.3 days) than for Manitoba males (2.0 days). However, age-specific days-of-hospitalization rate ratios were significantly higher for Manitoba women than for men only in the 60 years of age and older group. For young women (ages 20 to 44-years) the days-of-hospitalization rates were elevated, perhaps reflecting higher health care use in general among females in the childbearing years. This is reflected in a narrower gap in days-of-hospitalization between young women, with and without diabetes, than for males in the same age groups. This resulted in significantly lower female days-of-hospitalization rate ratios.

Females, both with and without diabetes, had consistently and significantly higher physician visits rates than males across all fiscal years, with about 2.5 more visits per year for women than for men with diabetes. Both individuals with and without diabetes have more physician visits as they become older. Rates increase gradually in the 15-to-19-year-old age group. Women's physician-visit rates are generally higher than men's between the ages of 10 and 79 years. Average physician-visit rates by age, sex and diabetes diagnoses are very different. For instance, both men and women without diabetes reach an average monthly physician visit by age 80 years. Men with diabetes visit a physician each month by age 60 years, while women with diabetes visit a physician monthly by age 30 years and older.

Physician-visit rates are considerably elevated for young women, perhaps reflecting higher health care use in general among women in the childbearing years. This is also reflected in a narrower gap between young women with and without diabetes than for men in the same age groups. Physician-visit rate ratios among people with diabetes, compared to those without, was significantly higher for Manitoba men (rate ratio 2.2) than for women (rate ratio 2.0). Average physician-visit rates were significantly higher for Manitoba females (11.5 visits) than for Manitoba males (9.1 visits) with diabetes. Age-specific physician-visit rate ratios of males are only significantly higher than use ratios of females for general practitioner visits between the ages of 15 and 64 years old and for specialist visits between the ages of 10 and 69 years old. There was no rate ratio difference for older Manitobans.

5.3 Diabetes in the Manitoba Aboriginal Population

The 2006 Canada Census identified 175,400 Aboriginal people in Manitoba, who represent about 6% Métis and 9% North American Indians in the Manitoba population. Aboriginal people in Manitoba are not distributed evenly in the province, with about half living in urban areas, one-third on reserves and the remainder in rural areas. They comprise more than half the population of the three northern health regions, between 21% and 29% of the middle three health regions (Parkland, Interlake, North Eastman), and less than 12% of the remaining southern regions' population. The Aboriginal population in Manitoba is also much younger, with a median age of 24 years, compared to 38 years in the overall Manitoba population. The rates in this report are based on the health information of 78,345 individuals who, at the end of March 2006, could be identified as having First Nation status. First Nations people experience diabetes at a higher severity than Manitobans overall.

The number of First Nations people with diabetes (as identified by Manitoba Health and Healthy Living) has more than tripled between 1989 and 2006. It is projected to increase by more than an additional 50% by 2016. By 2006, one in 10 Manitoba First Nations people had diabetes, compared to one in 16 Manitobans overall.

Since 1989, the number of male First Nations people with diabetes has almost quadrupled. This growth in numbers was not only due to population growth, as the age-adjusted rate of First Nations males with diabetes has grown from 7.1% in 1989 to 15.5% in 2006. This represents a diabetes growth rate of 0.5% per year, compared to 0.2% per year for Manitoba males overall. For male First Nations people, the rate of people with diabetes was almost three times higher than for Manitoba males.

For Manitoba First Nations people, the rate of females with diabetes has been higher than the male rate but the difference has been decreasing (from 5.3% in 1989 to 4.3% in 2006). Unlike Manitoba females overall, age-adjusted diabetes prevalence was highest in First Nations females at 19.9% in 2005/06. This was almost four times the age-adjusted rate of 5.2% in Manitoba females overall.

Diabetes affects First Nations people at much younger ages than Manitobans overall. Age-specific prevalence rates of First Nations people with diabetes start to be significantly higher than those of Manitobans overall by age 10. They reach a maximum for First Nations people between the ages of 60 to 79 years at 53% with diabetes. For Manitobans overall, ages peak at 70 to 84 years old with 22% of the population having diabetes. Therefore, First Nations people may also experience complications of diabetes at younger ages.

First Nations people were about three times as likely to be diagnosed with diabetes in any year, compared to Manitobans overall. The rate of new Manitoba diabetes cases was highest in First Nations females at 18 per 1,000 in 2006. This is more than three times the age-adjusted rate of new diagnoses (five per 1,000) in Manitoba females. For male First Nations people, the rate of new diagnoses was almost three times higher than for Manitoba males overall. For the Manitoba First Nations population, the rate of new female diabetes cases was significantly higher than the male rate with the difference of about seven per 1,000 in 1989. This difference has gradually decreased to two per 1,000 by 2006.

Similar to the younger ages of First Nations people with diabetes, the rates of new diabetes diagnoses in First Nations people start to be significantly higher than those of Manitobans overall by the age of 10 years. The rate of new diabetes diagnoses between 2002 and 2006 was highest for First Nations people between the ages of 55 to 84 years, at about 42 per 1,000, while incidence rates of Manitobans overall peaked at 65 to 79 years of age at 17 per 1,000.

The burden of diabetes is not distributed evenly in First Nations people throughout Manitoba: North Eastman, Parkland, Assiniboine and Central RHAs had

significantly higher rates of First Nations people living with diabetes, as well as new diabetes cases than Manitoba overall. South Eastman and Burntwood/Churchill regions had significantly lower rates of First Nations people with diabetes.

Not only are the rates of people with diabetes and the rate of new diabetes diagnoses several times higher in First Nations people than in Manitobans overall, but deaths and complications of diabetes within First Nations people diabetes cases are magnified as well. For example, age-adjusted death rates for First Nations people with diabetes (20 per 1,000 cases) were significantly higher than Manitoba's (15 per 1,000 cases). The death rate among people with diabetes, compared to those without, was significantly lower for First Nations people (rate ratio 1.7) than for the whole Manitoba population (rate ratio 2.2). This suggests that First Nations people without diabetes may be affected more than Manitobans overall with conditions that reduce life expectancy that are not related to diabetes.

Similar to death rates, average lower limb amputation rates in First Nations men and women with diabetes were more than three times higher compared to all Manitoba men and women with diabetes. Chronic kidney disease hospitalization rates in First Nations people with diabetes were more than twice as high, compared to the Manitoba population with diabetes. Average heart disease and stroke hospitalization rates in First Nations people with diabetes were more than 60% higher than in the overall Manitoba population with diabetes. Heart disease and stroke hospitalization risk among people with diabetes, compared to those without, was slightly, but significantly, lower for First Nations people than for the whole Manitoba population. This suggests a slightly elevated heart disease and stroke hospitalization risk in First Nations people without diabetes.

Higher health care use may reflect the increased burden of diabetes and its complications in Manitoba First Nations people. Physician-visit rates in First Nations people with diabetes were about 10% higher than in the overall Manitoba population and days-of-hospitalization rates in First Nations people with diabetes were more than 40% higher than in the overall Manitoba population. Days-of-hospitalization rate ratios among people with diabetes, compared to those without, were significantly lower for First Nations people than for the whole Manitoba population.

5.4 Diabetes in Manitoba Health Regions

The burden of diabetes in Manitoba is not evenly distributed among the regional health authorities. This section highlights significant differences between individual RHAs and Manitoba with respect to diabetes and its consequences.

The one RHA that had significantly lower rates and rate ratios on almost all of the diabetes-related surveillance measures in this report was South Eastman. Significantly lower measures include the rate of people with diabetes, the rate of First Nations people with diabetes, the rate of new diabetes cases, diabetes death rate, diabetes lower limb amputation rate, chronic kidney disease rate and rate ratio, heart disease and stroke rate and rate ratio, days-of-hospitalization rate and rate ratio, as well as one of the lowest diabetes premature death rates. South Eastman had a significantly higher physician-visit rate ratio than Manitoba, which may correspond with the overall lower complication and hospitalization burden. South Eastman also had one of the youngest populations in Manitoba, one of the lowest proportions of Aboriginal population, and has some of the most favourable socio-economic status indicators in Manitoba. These include lowest percentage of single-parent families, highest labour force participation rate, lowest unemployment rate and lowest rates of low income[1].

The RHA with significantly higher diabetes surveillance measures was Parkland. Significantly higher indicators include the rate of people with diabetes, the rate of First Nations people with diabetes, the rate of new diabetes cases, the rate of new diabetes cases among

[1] Information on socio economic status of health regions is available from Statistics Canada Community Profiles: http://www12.statcan.ca/english/census06/data/profiles/community/Index.cfm?Lang=E

First Nations people, diabetes lower limb amputation rate, chronic kidney disease rate and rate ratio, heart disease and stroke rate and rate ratio, days-of-hospitalization rate, physician-visits rate, as well as one of the highest diabetes premature death rates. On the other hand, Parkland had a significantly lower days-of-hospitalization rate ratio than Manitoba, and the lowest projected increase in diabetes cases. Parkland has more unfavourable demographic and socio-economic status conditions. These include one of the oldest populations, the lowest labour force participation rate in Manitoba, the second highest proportion of people without completed high school education and one of the highest low income rates.

Distinguishing diabetes-related characteristics of other RHAs are as follows:

- Although Winnipeg is home to more than half of the Manitoba population, and therefore influences Manitoba statistical averages, there were a few significant differences, compared to Manitoba as a whole. The rates of people with diabetes, new diabetes cases, and heart disease and stroke hospitalization rates of diabetes cases were significantly lower. At the same time, days-of-hospitalization rate and physician-visit rates and rate ratios were significantly higher. Higher health care use may indicate closer proximity and relative ease of access for Winnipeg residents to hospitals and physicians than in rural and remote Manitoba.
- Brandon had significantly lower diabetes-related deaths, amputation, and heart disease and stroke rates and rate ratios, indicating relative success in managing diabetes. However, days-of-hospitalization and physician-visit rates were significantly higher than Manitoba overall.
- North Eastman had significantly higher rates of people with diabetes, First Nations people with diabetes, new diabetes cases, and new diabetes cases among First Nations people. It had significantly lower rates and rate ratios of days of hospitalization and physician visits.
- Interlake also had a significantly higher rate of people with diabetes, along with significantly lower rates and rate ratios of days of hospitalization and physician visits.
- Central had significantly lower rates of people with diabetes, new diabetes cases and physician visits. It had significantly higher rates of First Nations people with diabetes, diabetes-related heart disease and stroke hospitalizations and physician-visit rate ratios.
- Assiniboine had significantly lower rates of new diabetes cases, physician visits and a lower heart disease and stroke hospitalization rate ratio. It had significantly higher rates of First Nations people with diabetes, new diabetes cases among First Nations people and days of hospitalization.
- NOR-MAN had significantly higher rates of people with diabetes, new diabetes cases, diabetes-related lower limb amputation rate, chronic kidney disease rate and rate ratio, and diabetes-related heart disease and stroke rate. It had significantly lower rates and rate ratios of days of hospitalization and physician visits.
- Finally, the combined regions of Burntwood and Churchill had significantly higher rates of people with diabetes, new diabetes cases, lower-limb amputations, chronic kidney disease rate and rate ratio, heart disease and stroke rate, days-of-hospitalization rate and physician-visit rate ratio as well as one of the highest diabetes premature death rates. On the other hand, Burntwood/Churchill had a significantly lower rate of First Nations people with diabetes, as well as a lower physician-visit rate and rate ratio. Burntwood/Churchill is characterized by: a very young population; a relatively high proportion of Aboriginal residents; geographic remoteness and some unfavourable socio-economic status indicators. These indicators include highest percentage of single-parent families in Manitoba, highest proportion of people without completed high school education, one of the lowest labour force participation rates and the highest unemployment rate.

5.5 Conclusions

Improvements in diabetes prevention and treatment have contributed to a decrease in the annual rate of deaths associated with diabetes. However, there have been more new cases of diabetes in each year. The associated increasing burden of diabetes and its consequences in Manitoba is a societal issue that presents challenges to policy makers and planners. For example, how to reduce the increasing rate of new diabetes cases, particularly in the population younger than 50 years of age; how to reduce the consistently elevated risk of complications in people with diabetes; and how to manage the associated increasing demand on health care resources.

Diabetes rates are higher in men than in women, but analysis of the causes of these higher male rates is beyond the scope of this report. These rates may be influenced by genetics, risk factor exposure, health care use, and other determinants of health. However, it is notable that men in Canada and Manitoba reported consistently and significantly higher proportions of overweight and obesity and lower proportions of fruit and vegetable consumption than women in population health surveys such as the *Canadian Community Health Survey*[10]. Thus, men may be identified as being at higher risk of diabetes and its complications, and the development of related sex-specific prevention and interventions should be explored.

Management of diabetes in both primary and acute care settings entails delaying or preventing the development of diabetes complications and addressing them once they occur. A policy goal is to ensure that all Manitobans have access to appropriate care, while avoiding excess health care use and costs of care. Manitoba diabetes surveillance data reveal considerable differences in health care use between men and women with diabetes. More study is needed on the gender specific determinants of health care uses, and the impact of diabetes care guidelines on sex-specific diabetes complications outcomes.

The elevated risk of chronic conditions such as diabetes and its complications in Canadian Aboriginal populations has been well documented and this report provides an updated perspective on the burden of diabetes in Manitoba First Nations people. However, it must be kept in mind that there are limitations to the data used. Surveillance information excludes identification of Métis people as well as a large proportion of First Nations people that are not captured by Manitoba administrative data systems. There is a need to improve surveillance to facilitate understanding and address the elevated chronic disease risk in the Manitoba Aboriginal population.

Elevated rates of diabetes and its complications in First Nations people call for enhanced and culturally-appropriate chronic disease prevention, education and care for Aboriginal people. Prevention and health services for Aboriginal people in Manitoba are fragmented among federal, provincial, regional, Aboriginal, and private-sector providers. This may hinder an integrated approach to chronic disease prevention and management and contribute to the elevated burden of diabetes in Manitoba First Nations people. More collaboration among stakeholders may be needed to develop effective chronic disease surveillance, prevention and care for Aboriginal people in Manitoba.

The manifestation of diabetes and its consequences in Manitoba regions is the result of the interaction of many factors such as demographics, geography, socio-economic status, access to health care resources, adherence to clinical guidelines by health practitioners and health promotion and chronic disease prevention activities. There is a need for research with specific program level data to help investigate the associations between these factors and diabetes outcomes. It is important to identify successful programs and region-specific needs to address socio-economic disparities and potential gaps in access to diabetes care.

The objective of surveillance is to guide appropriate action for chronic disease prevention and management. Diabetes surveillance information helped inform the development of a Call to Action aimed at reducing the burden of Type 2 diabetes and chronic disease in Manitoba[11].

[10] Information on modifiable risk factors in Manitoba is available from Statistics Canada Health Indicators at http://www.statcan.gc.ca/pub/82-221-x/2008001/5202301-eng.htm

[11] *Diabetes in Manitoba: A Call to Action* (http://www.gov.mb.ca/health/chronicdisease/diabetes/docs/calltoaction.pdf)

6 Appendices

6.1 Acknowledgements

Diabetes in Manitoba 1989 to 2006 was prepared and produced by the Chronic Disease Branch of Manitoba Health and Healthy Living with funding from the Public Health Agency of Canada.

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6.2 Data Tables

More detailed data tables are available for download at the website of the Chronic Disease Branch of Manitoba Health and Healthy Living: http://www.gov.mb.ca/health/chronicdisease/surveillance.html

Diabetes Prevalence Counts and Rates for Manitoba Health Regions

2005/06 (one year of age and older)	Total Cases	Total Population	Crude Rate (%)	Age Adjusted Rate (%)	Lower CI	Upper CI
Winnipeg	42,195	680,322	6.2	5.2	5.1	5.2
Brandon	3,222	50,814	6.3	5.5	5.3	5.7
North Eastman	3,017	40,326	7.5	6.3	6.1	6.6
South Eastman	2,737	61,313	4.5	4.5	4.3	4.6
Interlake	5,579	77,588	7.2	5.7	5.6	5.9
Central	5,299	102,537	5.2	4.7	4.6	4.8
Assiniboine	5,244	69,309	7.6	5.4	5.2	5.5
Parkland	3,619	42,356	8.5	6.5	6.3	6.7
NOR-MAN	1,921	24,742	7.8	8.2	7.8	8.6
Burntwood	3,704	46,127	8.0	12.1	11.6	12.5
Churchill	63	968	6.5	8.4	5.8	11.8
Manitoba	**76,608**	**1,196,657**	**6.4**	**5.5**	**5.4**	**5.5**
Manitoba Men	38,561	591,195	6.5	5.9	5.8	5.9
Manitoba Women	38,047	605,462	6.3	5.2	5.1	5.2
First Nations People	N/A	N/A	10.4	17.8	17.3	18.2

Diabetes Prevalence Counts and Rates for Winnipeg Community Areas

2005/06	Total Cases	Population	Crude Rate (%)	Age Adjusted Rate (%)	Lower CI	Upper CI
Assiniboine South	1,886	37,027	5.1	3.9	3.7	4.1
Downtown	5,500	79,154	6.9	6.5	6.3	6.6
Fort Gary	3,376	68,360	4.9	4.3	4.2	4.5
Inkster	2,066	31,935	6.5	6.6	6.3	6.9
Point Douglas	3,266	42,909	7.6	7.3	7.1	7.6
River East	5,841	94,479	6.2	4.9	4.8	5.1
River Heights	3,234	57,359	5.6	4.4	4.2	4.6
Seven Oaks	4,508	61,216	7.4	6.0	5.8	6.1
St. Boniface	2,903	52,082	5.6	4.7	4.5	4.8
St. Vital	3,568	62,588	5.7	4.6	4.5	4.8
St. James - Assiniboia	4,087	59,839	6.8	4.9	4.8	5.1
Transcona	1,960	33,374	5.9	5.5	5.3	5.8

Diabetes Incidence Counts and Rates for Manitoba Health Regions

2001/02 to 2005/06 Average (one year of age and older)	New Cases	Prevalence Adjusted Population	Crude Rate (per 1000)	Age Adjusted Rate (per 1000)	Lower CI	Upper CI
Winnipeg	3,594	640,426	5.6	5.2	5.1	5.2
Brandon	273	46,864	5.8	5.7	5.4	6.0
North Eastman	246	37,520	6.6	6.2	5.9	6.6
South Eastman	248	56,193	4.4	4.8	4.5	5.0
Interlake	442	71,871	6.2	5.5	5.3	5.7
Central	449	96,418	4.7	4.6	4.4	4.8
Assiniboine	406	65,943	6.2	5.0	4.8	5.3
Parkland	274	39,813	6.9	6.0	5.6	6.3
NOR-MAN	157	23,538	6.7	7.8	7.3	8.4
Burntwood	294	42,361	6.9	10.9	10.3	11.6
Churchill	5	967	5.4			
Manitoba	**6,390**	**1,122,131**	**5.7**	**5.4**	**5.3**	**5.5**
Manitoba Men	3,343	553,996	6.0	6.0	5.9	6.1
Manitoba Women	3,046	568,134	5.4	4.9	4.8	5.0
First Nations People	N/A	N/A	8.4	16.6	15.8	17.3

Diabetes Incidence Counts and Rates for Winnipeg Community Areas

2001/02 to 2005/06 Average	New Cases	Prevalence Adjusted Population	Crude Rate (per 1000)	Age Adjusted Rate (per 1000)	Lower CI	Upper CI
Assiniboine South	159	35,740	4.5	3.8	3.5	4.1
Downtown	470	75,371	6.2	6.2	6.0	6.5
Fort Gary	301	63,843	4.7	4.5	4.3	4.8
Inkster	181	30,044	6.0	6.8	6.3	7.2
Point Douglas	290	39,832	7.3	7.7	7.3	8.1
River East	481	88,989	5.4	4.8	4.6	5.0
River Heights	282	54,937	5.1	4.4	4.1	4.6
Seven Oaks	386	56,076	6.9	6.2	5.9	6.4
St. Boniface	259	47,854	5.4	4.9	4.6	5.2
St. Vital	307	59,127	5.2	4.7	4.5	4.9
St. James - Assiniboia	324	56,897	5.7	4.6	4.4	4.9
Transcona	154	31,717	4.9	4.9	4.6	5.3

Death Rates and Rate Ratios for Manitoba Health Regions

2001/02 to 2005/06 Average (20 years and older	With Diabetes				With Diabetes / Non-Diabetes		
	Crude Rate (per 1000)	Age Adjusted Rate (per 1000)	Lower CI	Upper CI	Rate Ratio	Lower CI	Upper CI
Winnipeg	38.5	15.6	14.9	16.4	2.3	2.2	2.4
Brandon	34.7	11.0	9.5	12.6	1.7	1.4	1.9
North Eastman	29.7	14.3	12.1	16.9	2.1	1.8	2.5
South Eastman	34.3	11.4	10.0	12.9	2.0	1.7	2.3
Interlake	33.3	14.4	12.4	16.5	2.2	1.9	2.5
Central	40.9	13.6	12.3	15.1	2.2	2.0	2.5
Assiniboine	41.8	15.0	12.6	17.7	2.3	2.0	2.8
Parkland	41.3	15.2	13.1	17.5	2.2	1.9	2.6
NOR-MAN	30.6	16.9	14.2	20.0	2.0	1.7	2.4
Burntwood	23.1	19.0	16.9	21.3	2.0	1.7	2.4
Churchill	35.5						
Manitoba	**37.0**	**15.0**	**14.5**	**15.5**	**2.2**	**2.2**	**2.3**
Manitoba Men	38.3	16.9	16.1	17.7	2.0	1.9	2.1
Manitoba Women	35.8	13.2	12.5	13.9	2.4	2.3	2.6
First Nations People	24.6	20.6	19.1	22.5	1.7	1.5	1.9

Death Rates and Rate Ratios for Winnipeg Community Areas

2001/02 to 2005/06 Average	With Diabetes				With Diabetes / Non-Diabetes		
	Crude Rate (per 1000)	Age Adjusted Rate (per 1000)	Lower CI	Upper CI	Rate Ratio	Lower CI	Upper CI
Assiniboine South	44.4	13.7	11.3	16.4	2.3	1.9	2.8
Downtown	51.0	23.1	20.9	25.5	2.1	2.0	2.5
Fort Gary	31.0	13.2	10.5	16.4	2.5	2.0	3.1
Inkster	28.4	13.6	11.7	15.8	2.1	1.7	2.4
Point Douglas	38.9	18.3	15.5	21.6	2.0	1.7	2.4
River East	37.9	15.3	13.2	17.8	2.5	2.1	2.9
River Heights	40.9	13.4	11.1	16.0	2.2	1.8	2.6
Seven Oaks	39.4	16.8	13.8	20.2	2.4	2.1	3.1
St. Boniface	33.5	12.8	11.0	14.9	2.2	1.9	2.5
St. Vital	33.6	11.9	10.2	13.9	2.1	1.7	2.4
St. James - Assiniboia	39.0	14.6	12.0	17.7	2.2	1.8	2.6
Transcona	29.2	12.4	10.5	14.7	1.9	1.6	2.2

Lower Limb Amputation for Manitoba Health Regions

1999/2000 to 2003/04 (20 years and older)	Total Amputated Without Diabetes	Total Amputated With Diabetes	With Diabetes			
			Crude Rate (per 1000)	Age Adjusted Rate (per 1000)	Lower CI	Upper CI
Winnipeg	216	565	3.4	2.0	1.7	2.3
Brandon	9	29	2.3	1.1	0.6	1.8
North Eastman	14	50	4.2	2.1	1.4	2.9
South Eastman	11	30	2.9	1.2	0.8	1.7
Interlake	23	95	4.2	2.1	1.6	2.7
Central	39	93	4.3	2.4	1.8	3.3
Assiniboine	17	69	3.1	1.7	1.1	2.5
Parkland	22	100	6.5	3.0	2.3	3.9
NOR-MAN	5	45	5.6	3.6	2.3	5.3
Burntwood	8	110	7.3	5.3	4.3	6.5
Churchill	0	<5	8.9			
Manitoba	**364**	**1,186**	**3.8**	**2.2**	**2.0**	**2.4**
Manitoba Men	201	759	4.9	2.8	2.5	3.2
Manitoba Women	163	427	2.8	1.5	1.3	1.7
First Nations People	N/A	N/A	8.9	6.5	5.8	7.4

Lower Limb Amputation for Winnipeg Community Areas

1999/2000 to 2003/04	Total Amputated Without Diabetes	Total Amputated With Diabetes	With Diabetes			
			Crude Rate (per 1000)	Age Adjusted Rate (per 1000)	Lower CI	Upper CI
Assiniboine South	8	13	1.7	0.5	0.3	0.9
Downtown	42	135	5.8	3.5	2.8	4.3
Fort Gary	10	31	2.4	1.1	0.7	1.6
Inkster	6	29	3.6	2.4	1.2	4.3
Point Douglas	20	71	5.3	4.1	2.3	6.6
River East	34	64	2.8	1.6	0.8	2.9
River Heights	27	38	2.9	1.5	0.9	2.2
Seven Oaks	20	59	3.4	2.2	0.9	4.3
St. Boniface	12	23	2.1	0.8	0.5	1.2
St. Vital	11	32	2.3	1.2	0.7	1.9
St. James - Assiniboia	22	45	2.7	1.3	0.8	1.8
Transcona	<5	25	3.1	1.5	0.9	2.4

Chronic Kidney Disease Rates and Rate Ratios for Manitoba Health Regions

1999/2000 to 2003/04 Average	With Diabetes				With Diabetes / Non-Diabetes		
	Crude Rate (per 1000)	Age Adjusted Rate (per 1000)	Lower CI	Upper CI	Rate Ratio	Lower CI	Upper CI
Winnipeg	12.1	7.5	6.8	8.2	9.9	8.9	10.9
Brandon	13.6	7.1	5.2	9.4	8.2	5.9	11.3
North Eastman	12.3	6.7	5.5	8.2	7.2	5.6	9.4
South Eastman	14.4	5.9	4.5	7.5	6.0	4.5	7.9
Interlake	15.6	8.0	7.0	9.1	8.5	7.1	10.1
Central	18.7	10.0	8.2	12.0	10.9	8.8	13.4
Assiniboine	16.1	7.8	6.6	9.1	7.7	6.4	9.3
Parkland	21.2	11.9	10.1	14.0	11.8	9.6	14.5
NOR-MAN	19.0	10.5	8.7	12.5	8.7	6.5	11.6
Burntwood	18.7	12.5	10.9	14.3	8.7	6.6	11.4
Churchill	32.6						
Manitoba	**14.2**	**8.0**	**7.6**	**8.5**	**9.4**	**8.8**	**10.0**
Manitoba Men	15.0	8.7	8.0	9.4	7.2	6.6	7.8
Manitoba Women	13.5	7.5	7.0	8.1	11.9	10.9	13.0
First Nations People	27.8	20.0	18.5	21.6	10.3	8.4	12.5

Chronic Kidney Disease Rates and Rate Ratios for Winnipeg Community Areas

1999/2000 to 2003/04 Average	With Diabetes				With Diabetes / Non-Diabetes		
	Crude Rate (per 1000)	Age Adjusted Rate (per 1000)	Lower CI	Upper CI	Rate Ratio	Lower CI	Upper CI
Assiniboine South	11.9	6.5	3.4	11.1	8.9	5.0	15.9
Downtown	17.8	13.5	11.0	16.3	12.9	10.3	16.1
Fort Gary	13.3	6.6	4.9	8.7	9.5	6.9	13.0
Inkster	12.0	9.9	6.0	15.4	17.7	10.5	29.9
Point Douglas	13.0	9.3	7.1	11.8	11.5	8.4	15.5
River East	10.9	6.2	4.7	7.9	7.7	5.9	10.1
River Heights	13.3	5.5	4.2	7.2	8.1	6.0	10.9
Seven Oaks	12.0	7.8	5.9	10.2	10.9	8.0	14.7
St. Boniface	7.5	5.5	3.3	8.6	8.9	5.5	14.6
St. Vital	8.5	3.4	2.6	4.4	4.8	3.6	6.4
St. James - Assiniboia	11.4	4.8	3.9	6.0	6.0	4.7	7.6
Transcona	8.5	4.4	2.9	6.5	6.4	4.0	10.1

Circulatory System Diseases Rates and Rate Ratios for Manitoba Health Regions

1999/2000 to 2003/04 Average	With Diabetes				With Diabetes / Non-Diabetes		
	Crude Rate (per 1000)	Age Adjusted Rate (per 1000)	Lower CI	Upper CI	Rate Ratio	Lower CI	Upper CI
Winnipeg	108.7	51.6	50.3	52.9	3.4	3.3	3.5
Brandon	106.4	46.5	42.6	50.7	3.0	2.7	3.2
North Eastman	108.7	56.9	53.0	61.0	3.2	3.0	3.5
South Eastman	125.9	53.2	49.0	57.7	3.1	2.8	3.3
Interlake	119.6	58.7	55.0	62.5	3.2	3.0	3.4
Central	156.5	72.8	68.2	77.6	3.5	3.3	3.8
Assiniboine	147.6	60.2	56.6	64.0	2.9	2.8	3.1
Parkland	175.5	83.9	78.5	89.5	3.6	3.3	3.8
NOR-MAN	131.7	76.1	70.3	82.2	3.5	3.2	3.8
Burntwood	123.8	91.7	87.0	96.5	3.1	2.9	3.4
Churchill	192.9						
Manitoba	**120.9**	**58.5**	**57.5**	**59.4**	**3.4**	**3.3**	**3.5**
Manitoba Men	123.4	62.0	60.6	63.5	3.1	3.0	3.2
Manitoba Women	118.4	55.1	53.8	56.4	3.7	3.6	3.8
First Nations People	127.1	96.1	92.8	99.4	3.0	2.9	3.2

Circulatory System Diseases Rates and Rate Ratios for Winnipeg Community Areas

1999/2000 to 2003/04 Average	With Diabetes				With Diabetes / Non-Diabetes		
	Crude Rate (per 1000)	Age Adjusted Rate (per 1000)	Lower CI	Upper CI	Rate Ratio	Lower CI	Upper CI
Assiniboine South	104.6	46.5	40.2	53.5	3.4	2.9	3.9
Downtown	119.8	64.3	60.5	68.2	3.8	3.5	4.0
Fort Gary	112.7	52.8	47.8	58.1	3.5	3.2	3.9
Inkster	87.2	49.9	44.1	56.4	3.6	3.2	4.1
Point Douglas	111.5	57.7	53.5	62.2	3.5	3.2	3.8
River East	105.3	47.9	44.5	51.5	3.2	3.0	3.5
River Heights	121.5	52.7	48.0	57.7	3.5	3.2	3.9
Seven Oaks	104.2	48.7	44.5	53.1	3.5	3.2	3.8
St. Boniface	100.1	45.8	41.4	50.6	3.0	2.7	3.4
St. Vital	113.1	46.9	43.7	50.3	2.9	2.7	3.2
St. James - Assiniboia	110.8	44.6	41.6	47.9	3.0	2.8	3.3
Transcona	88.7	46.9	41.3	53.1	3.1	2.8	3.6

Days-of-hospitalization Rates and Rate Ratios for Manitoba Health Regions

2001/02 to 2005/06 Average	With Diabetes				With Diabetes / Non-Diabetes		
	Crude Rate (per person)	Age Adjusted Rate (per person)	Lower CI	Upper CI	Rate Ratio	Lower CI	Upper CI
Winnipeg	4.1	2.2	2.1	2.2	3.6	3.6	3.7
Brandon	5.2	2.7	2.6	2.9	3.6	3.4	3.8
North Eastman	3.3	1.6	1.6	1.7	2.7	2.6	2.7
South Eastman	4.3	1.7	1.7	1.7	3.0	2.9	3.1
Interlake	3.5	1.8	1.8	1.8	3.3	3.2	3.4
Central	4.8	2.3	2.2	2.4	3.5	3.3	3.6
Assiniboine	5.2	2.6	2.5	2.7	3.6	3.5	3.7
Parkland	5.0	2.5	2.4	2.5	3.1	3.0	3.2
NOR-MAN	2.8	1.8	1.7	1.8	2.8	2.7	2.9
Burntwood	3.3	2.8	2.7	2.9	3.3	3.2	3.4
Churchill	12.6						
Manitoba	**4.2**	**2.2**	**2.2**	**2.2**	**3.5**	**3.5**	**3.5**
Manitoba Men	4.0	2.0	2.0	2.1	3.3	3.3	3.4
Manitoba Women	4.4	2.3	2.3	2.4	3.6	3.5	3.6
First Nations People	4.0	3.1	3.0	3.2	2.7	2.7	2.7

Days-of-hospitalization Rates and Rate Ratios for Winnipeg Community Areas

2001/02 to 2005/06 Average	With Diabetes				With Diabetes / Non-Diabetes		
	Crude Rate (per person)	Age Adjusted Rate (per person)	Lower CI	Upper CI	Rate Ratio	Lower CI	Upper CI
Assiniboine South	3.6	2.0	2.0	2.1	3.9	3.8	4.1
Downtown	5.8	3.5	3.4	3.6	3.4	3.3	3.5
Fort Gary	3.2	1.7	1.6	1.7	3.7	3.6	3.8
Inkster	3.2	2.3	2.2	2.3	4.1	3.9	4.2
Point Douglas	4.6	2.8	2.6	2.9	3.7	3.5	3.9
River East	3.8	2.1	2.0	2.1	4.1	3.9	4.2
River Heights	4.2	1.6	1.6	1.7	3.0	2.9	3.1
Seven Oaks	4.6	2.5	2.4	2.5	4.3	4.2	4.4
St. Boniface	3.3	1.4	1.4	1.5	2.6	2.5	2.7
St. Vital	3.4	1.4	1.3	1.5	2.9	2.8	3.1
St. James - Assiniboia	3.9	1.6	1.5	1.6	2.7	2.6	2.7
Transcona	2.9	1.5	1.4	1.6	3.0	2.9	3.1

Physician Visits Rates and Rate Ratios for Manitoba Health Regions

2001/02 to 2005/06 Average	With Diabetes				With Diabetes / Non-Diabetes		
	Crude Rate (per person)	Age Adjusted Rate (per person)	Lower CI	Upper CI	Rate Ratio	Lower CI	Upper CI
Winnipeg	14.0	11.1	11.1	11.2	2.1	2.1	2.1
Brandon	14.3	12.1	11.9	12.3	2.1	2.1	2.1
North Eastman	11.8	9.2	9.1	9.4	1.9	1.9	2.0
South Eastman	12.1	10.2	10.0	10.4	2.2	2.2	2.3
Interlake	11.9	9.0	8.9	9.2	2.0	2.0	2.1
Central	11.4	9.6	9.4	9.9	2.2	2.2	2.3
Assiniboine	12.0	9.5	9.3	9.6	2.1	2.0	2.1
Parkland	13.1	10.9	10.7	11.1	2.1	2.1	2.2
NOR-MAN	11.9	8.9	8.7	9.1	1.9	1.9	2.0
Burntwood	10.4	8.5	8.4	8.7	2.2	2.2	2.3
Churchill	7.6						
Manitoba	**13.1**	**10.4**	**10.3**	**10.4**	**2.1**	**2.1**	**2.1**
Manitoba Men	12.3	9.1	9.1	9.2	2.2	2.2	2.2
Manitoba Women	13.9	11.5	11.4	11.6	2.0	2.0	2.0
First Nations People	14.1	11.4	11.3	11.5	2.1	2.1	2.1

Physician Visits Rates and Rate Ratios for Winnipeg Community Areas

2001/02 to 2005/06 Average	With Diabetes				With Diabetes / Non-Diabetes		
	Crude Rate (per person)	Age Adjusted Rate (per person)	Lower CI	Upper CI	Rate Ratio	Lower CI	Upper CI
Assiniboine South	14.1	10.8	10.6	11.1	2.1	2.0	2.1
Downtown	16.4	13.6	13.3	13.9	2.4	2.3	2.4
Fort Gary	12.7	9.9	9.7	10.0	2.0	2.0	2.1
Inkster	13.5	12.8	12.5	13.1	2.5	2.4	2.6
Point Douglas	15.0	11.9	11.7	12.1	2.1	2.1	2.1
River East	12.9	10.1	10.0	10.3	2.1	2.0	2.1
River Heights	14.6	10.2	10.0	10.4	1.9	1.9	2.0
Seven Oaks	13.9	11.2	11.0	11.4	2.1	2.1	2.2
St. Boniface	13.0	10.3	10.0	10.5	2.0	1.9	2.0
St. Vital	13.6	10.0	9.8	10.2	1.9	1.9	2.0
St. James - Assiniboia	13.9	9.8	9.6	10.0	1.9	1.9	1.9
Transcona	12.1	9.3	9.1	9.5	1.9	1.9	1.9

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